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FIELD INVESTIGATION OF EMISSIONS FROM COMBUSTION EQUIPMENT FOR SPACE HEATING

DATA SUPPLEMENT

BATTELLE COLUMBUS LABORATORIES

PREPARED FOR

NATIONAL ENVIRONMENTAL RESEARCH CENTER

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17. Key Words and Document Analysis. 17a. Descriptors

Air Pollution	Nitrogen Oxides	Sulfur Trioxide
Space Heating	Nitrogen Oxide (NO)	Natural Gas
Residential Buildings	Nitrogen Dioxide	Fuel Oil
Commercial Buildings	Particulate Composites	
Combustion	Smoke	
Emission	Carbon Monoxide	
Burners	Hydrocarbons	
Boilers	Sulfur Oxides	
Furnaces	Sulfur Dioxide	

17b. Identifiers/Open-Ended Terms

Air Pollution Control	No. 5 Oil
Stationary Sources	No. 6 Oil
Emission Factors	
No. 2 Oil	
No. 4 Oil	

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Field Investigation of Emissions from Combustion Equipment for Space Heating (Data Supplement)

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FIELD INVESTIGATION OF EMISSIONS FROM COMBUSTION EQUIPMENT FOR SPACE HEATING

(Data Supplement)

FOREWORD TO DATA SUPPLEMENT VOLUME

The purpose of this Data Supplement Volume is to record individual data points and plots in greater detail than is practical in the main report volume. It is intended for use in conjunction with the main report volume by researchers who wish to refer to individual data points.

Readers are referred to the main report for information as to objectives, selection of units, measurement procedures, data averages, and interpretations.

This volume contains the emissions data, plots of emissions versus CO_2, computed emission factors, and emission concentrations corrected to 3 percent O_2 in the flue gas. The material is arranged as follows:

Appendix G – Data for Residential Units **(pages G-1 through G-66)**

Appendix H – Data for Commercial Boilers **(pages H-1 through H-110)**

Appendix I – Calculated Emission Factors for Residential Units **(pages I-1 through I-20)**

Appendix J – Calculated Emission Factors for Commercial Boilers. **(pages J-1 through J-24)**

Details necessary for interpretation of these data and results are presented below.

Appendix G. Data for Residential Units (Pages G-1 Through G-66)

Appendix G contains data on Phase II Residential Units 23 through 35 for the "as-found", "tuned", and "reference fuel" conditions for the cyclic and varied-air runs.

For both cyclic runs and varied-air runs, data are presented to define the combustion conditions (Bacharach smoke number, CO_2, and O_2) and corrected gaseous emissions* (CO, HC, NO, and NO_x). For the cyclic runs, particulate emission loadings of the flue gas are presented

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*Corrections for interferences were made as follows:

True CO (ppm) = NO measured with NDIR (ppm) $-1.25 \cdot CO_2$ (%) $- 0.8$

True NO (ppm) = NO measured with NDIR (ppm) $- \frac{CO_2 (\%)}{5}$

True NO_x (ppm) = NO_x measured with NDIR and converter (ppm) $- \frac{CO_2 (\%)}{5}$

No correction was necessary when measuring NO_x with electrochemical fuel cells (first and second visits to residential units).

based on measurements using the EPA particulate sampling procedure[2]. Particulate loadings are presented for "filterable" particulate (the probe and filter catch) and "total" particulate (including the impinger catch). Where available, gas temperatures at the sampling point are reported for the varied-air runs.

Plots of gaseous emissions as a function of CO_2 are also presented for the varied-air runs.

Appendix H. Data for Commercial Boilers (Pages H-1 Through H-110)

Appendix H contains data for the Phase II commercial boilers. Data are given for runs with each of the fuels fired in each boiler and for each load at which the boiler was operated.

Data are presented to define combustion conditions (Bacharach smoke numbers, CO_2, and O_2), gas temperatures at the sampling point, corrected gaseous emissions* (CO, HC, NO, NO_x, and SO_2), and "filterable" and "total" particulate loadings based on the EPA procedure[2].

Plots of gaseous emissions as a function of CO_2 are also presented for each boiler, fuel, and load.

Appendix I. Calculated Emission Factors for Residential Units (Pages I-1 Through I-20)

Appendix I consists of computer printouts of calculated emission factors (pounds of pollutant emitted per 1000 gal of oil fired) for gaseous pollutants and "filterable" particulate and "total" particulate for both cyclic and varied-air runs on the residential units. Also shown are the calculated excess-air values and volumes of flue gas generated per pound of fuel. Gaseous emission concentrations calculated at 3 percent oxygen are shown in the second part of this appendix.

Appendix J. Calculated Emission Factors for Commercial Boilers (Pages J-1 Through J-24)

Appendix J consists of computer printouts of calculated emission factors (lb/1000 gal of fuel fired for oil firing and lb/10^6 cu ft of natural gas for gas firing) for gaseous pollutants for each boiler, fuel, and load. Also shown are the calculated excess-air values and volumes of flue gas generated per pound of fuel. Gaseous emission concentrations calculated at 3 percent oxygen are shown in the second part of this appendix.

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[2] "Standards of Performance for New Stationary Sources", Federal Register, Vol. 36, No. 139, Part II, pp 15704-15722, August 17, 1971.

*See footnote, page 1, for interference-correction formulas.

APPENDIX G

DATA FOR RESIDENTIAL UNITS

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 23

Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m³[c]	
		Smoke No.[a]	CO_2,%[b]	O_2,%[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	0.3 (0.3)	9.2	9.1	3.7	8.3	67.	85.	5.8	13.5
Tuned	"	0.5 (0.5)	9.9	7.8	2.7	5.7	82.	89.	3.1	19.7
"	Reference	0.4 (0.3)	9.4	8.2	2.6	3.2	75.	79.	3.2	16.1
Second visit	House	0.1 (0.1)	8.8	9.7	7.0	6.8	86.	84.	—	—
" "	Reference	0.1 (0.2)	8.4	9.3	6.7	7.7	76.	77.	—	—
Third visit	House	0.0 (0.0)	8.7	9.0	4.5	8.3	85.	85.	—	—
" "	Reference	0.0 (0.0)	8.8	8.8	2.9	4.8	91.	97.	6.3	23.0

(a) At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).
(b) Average for "on" period of cycle.
(c) Based on sample collected during six 10-minute cycles.

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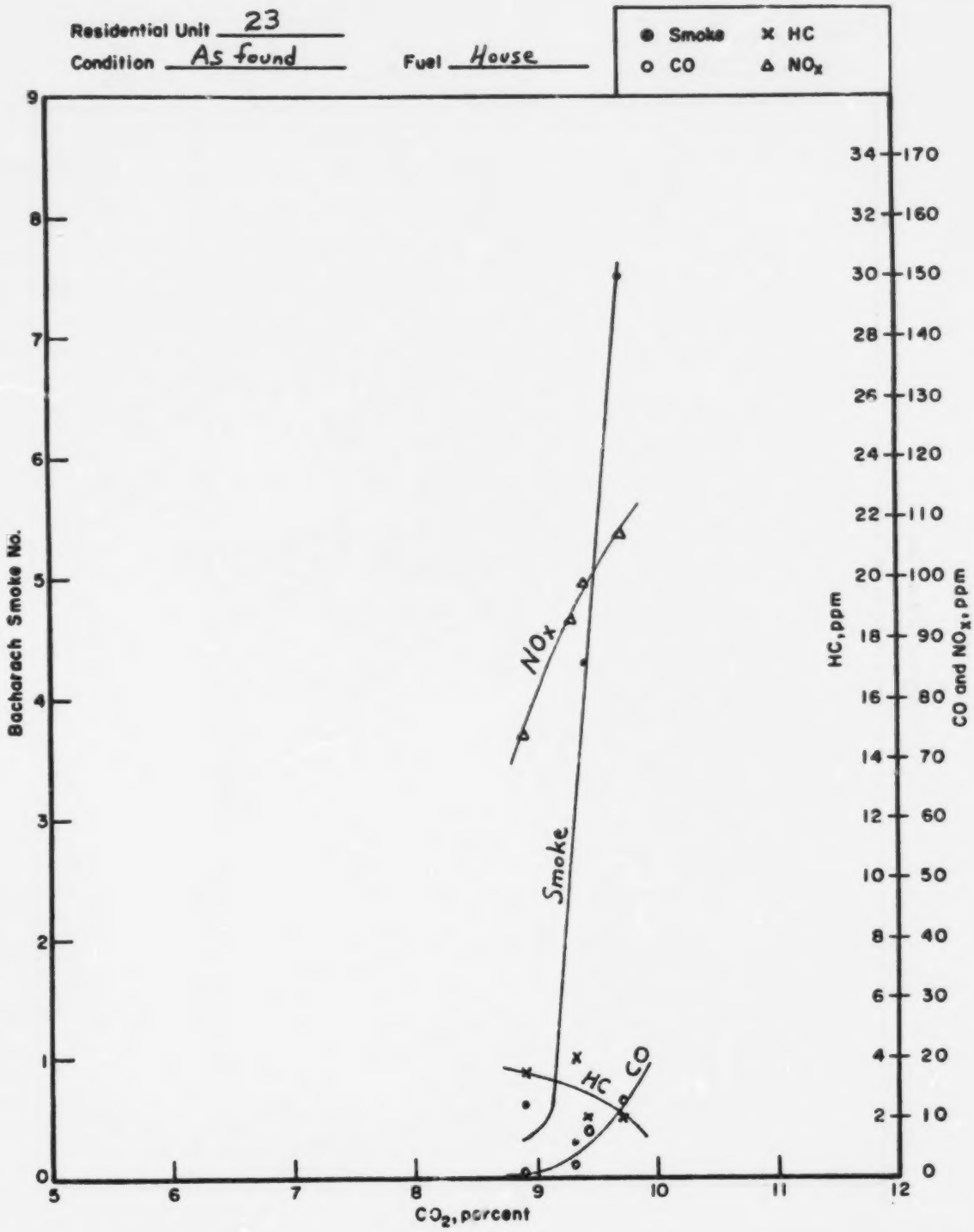
SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

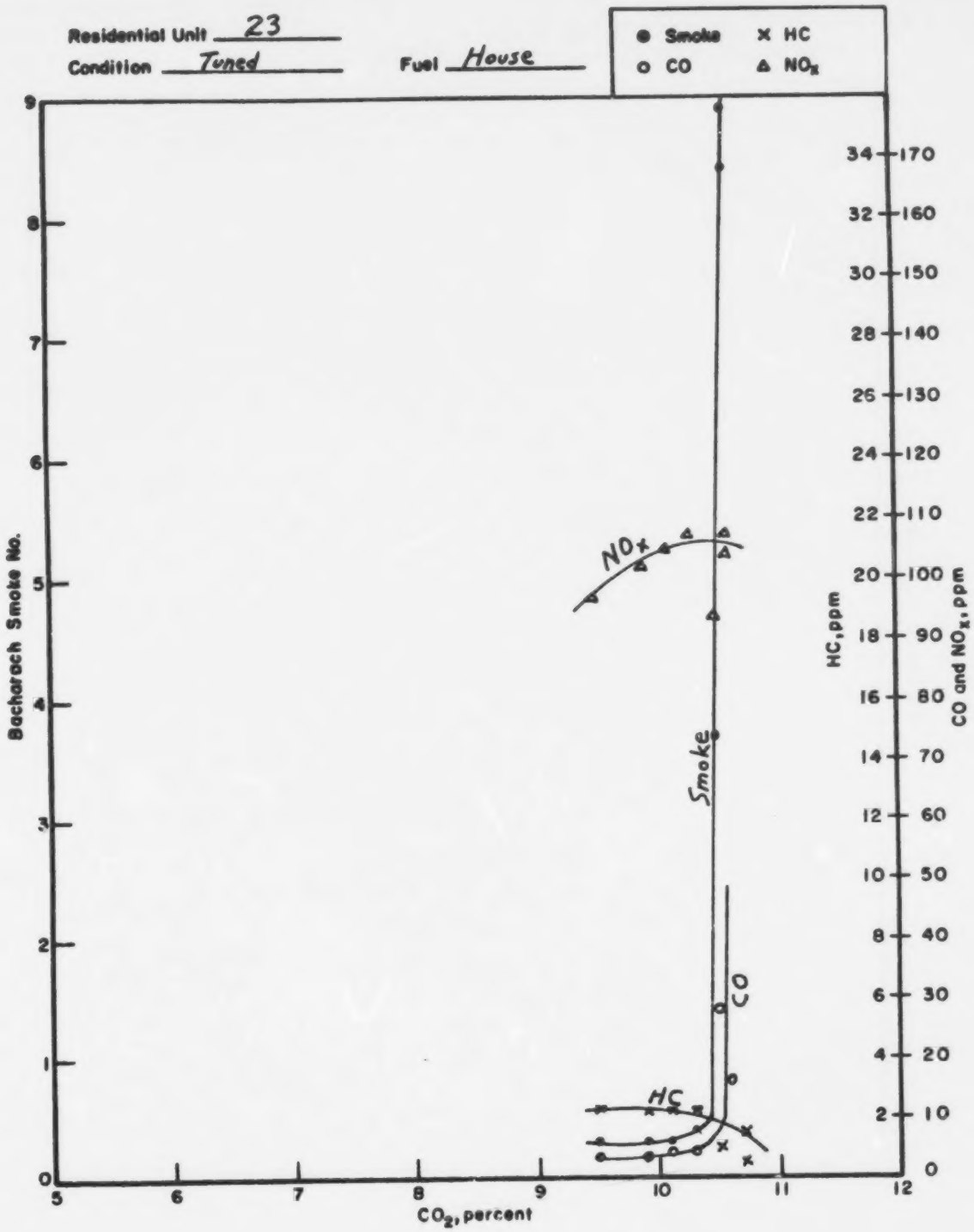
Residential Unit 23

Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	House	0.6	8.9	9.7		1.	3.5	60.	74.
		0.3	9.3	9.1		2.	4.0	69.	93.
		4.3	9.4	8.4		8.	2.0	57.	99.
		7.5	9.7	8.5		13.	2.0	59.	107.
Tuned	House	0.3	9.5	8.9		3.	2.3	71.	97.
		0.3	9.9	8.7		3.	2.2	73.	102.
		0.3	10.1	8.5		4.	2.2	73.	105.
		0.4	10.3	8.3		4.	2.2	71.	107.
		3.7	10.5	8.0		28.	1.0	68.	94.
		8.9	10.6	7.7		266.	1.5	48.	104.
		8.4	10.6	7.8		16.	0.5	58.	107.
Tuned	Reference	0.3	9.3	8.3		3.	1.3	73.	78.
		0.3	9.3	8.3		5.	1.0	75.	80.
		0.0	9.9	7.5		4.	1.0	81.	87.
		1.6	10.1	7.4		4.	1.3	73.	80.
		8.7	10.2	7.3		89.	1.0	58.	70.

Residential Unit 23
Condition As found
Fuel House



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



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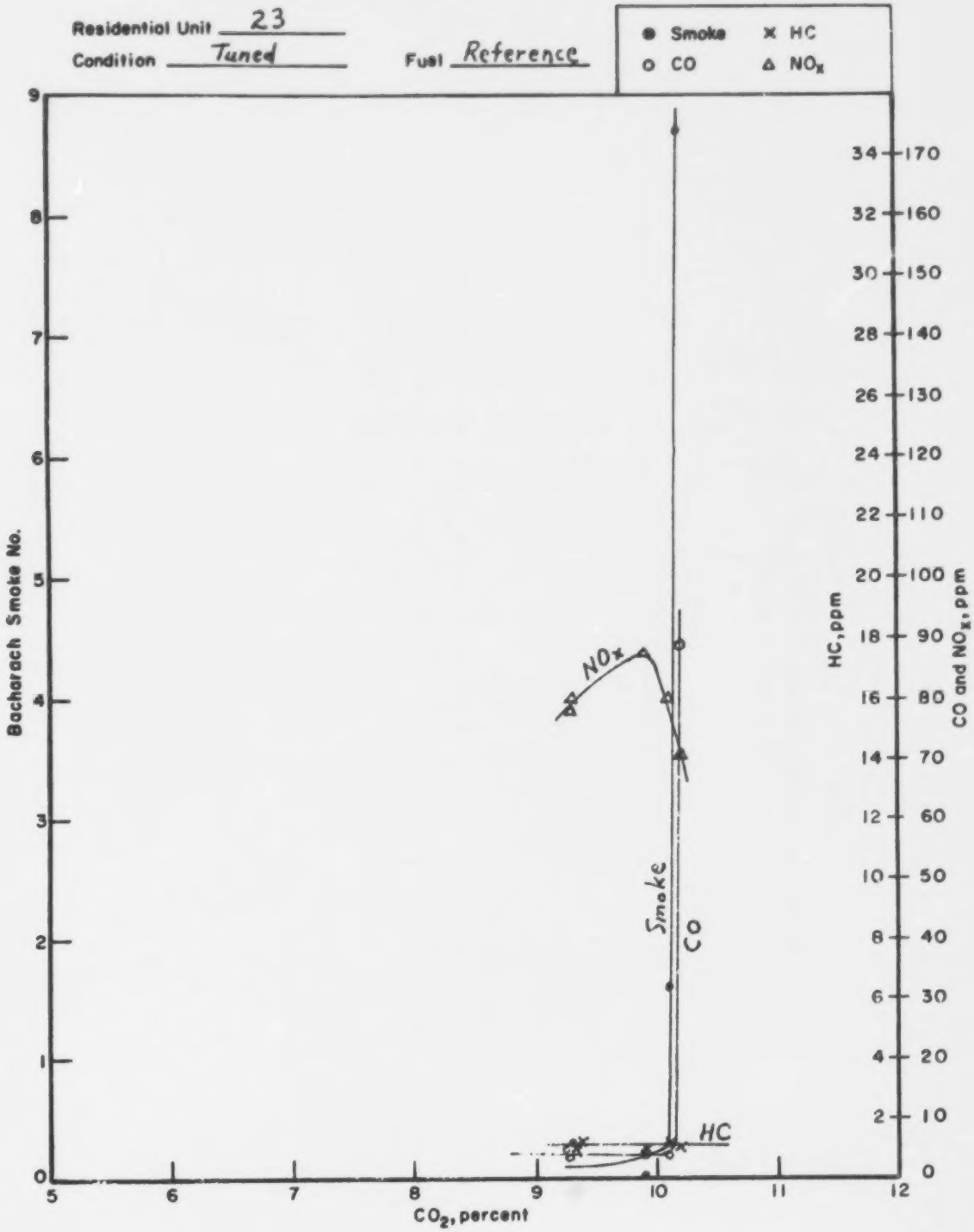


SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 24

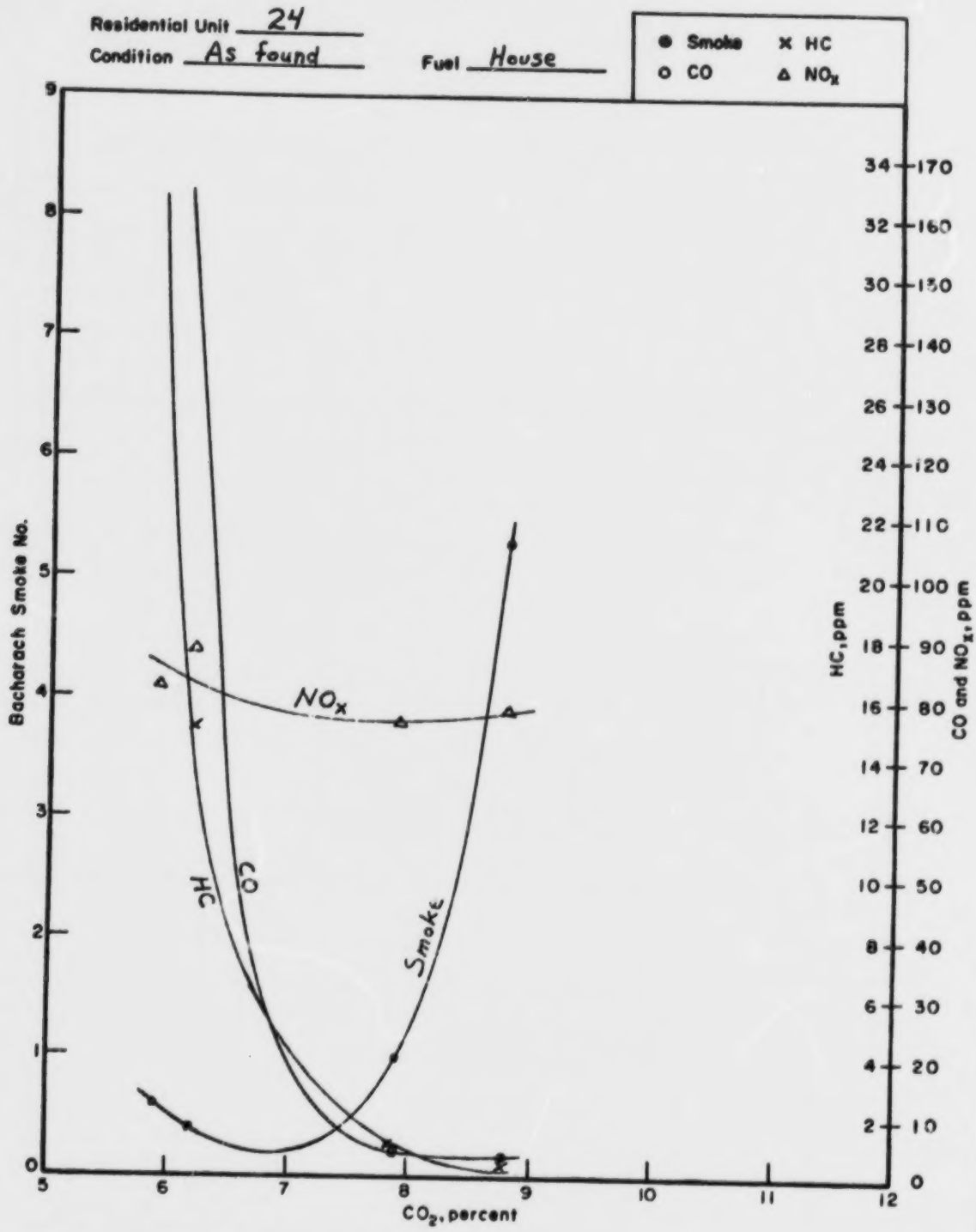
Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m^3[c]	
		Smoke No.[a]	CO_2, %[b]	O_2, %[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	0.4 (0.3)	7.1	12.0	222.	12.2	39.	78.	3.2	11.0
Tuned	"	0.7 (0.7)	8.9	9.0	4.1	3.1	71.	76.	13.7	41.0
	Reference	0.8 (1.4)	9.2	8.5	9.5	4.5	69.	71.	12.5	20.9
Second visit	House	0.2 (0.3)	8.8	9.0	20.1	5.3	59.	60.	—	—
" "	Reference	0.1 (0.2)	9.0	8.3	18.3	11.7	62.	64.	—	—
Third visit	House	0.2 (0.5)	7.8	10.5	41.4	28.7	56.	58.	—	—
" "	Reference	0.7 (0.7)	8.6	9.2	19.9	21.0	64.	64.	7.7	26.6

(a) At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).
(b) Average for "on" period of cycles.
(c) Based on sample collected during six 10-minute cycles.

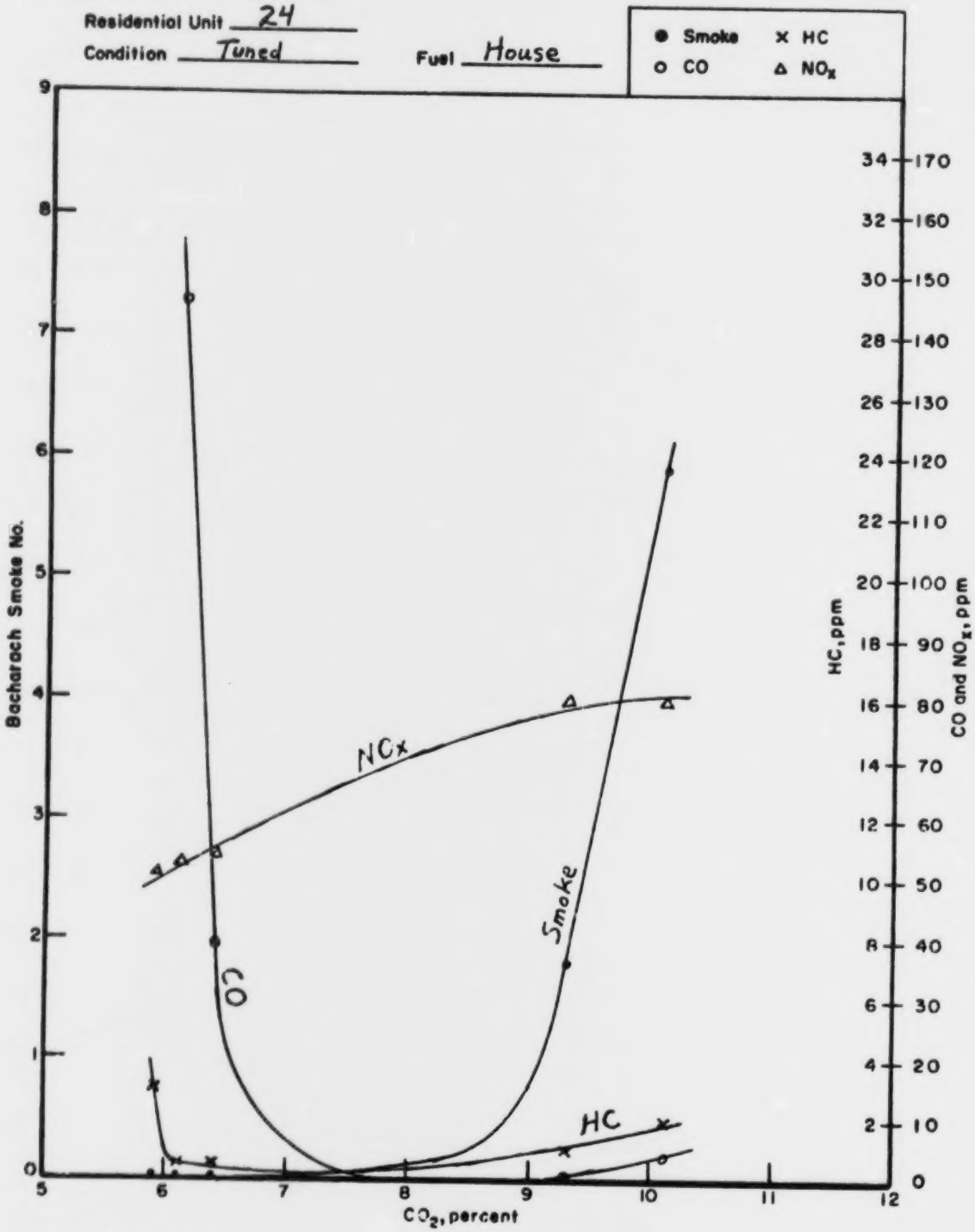
SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 24

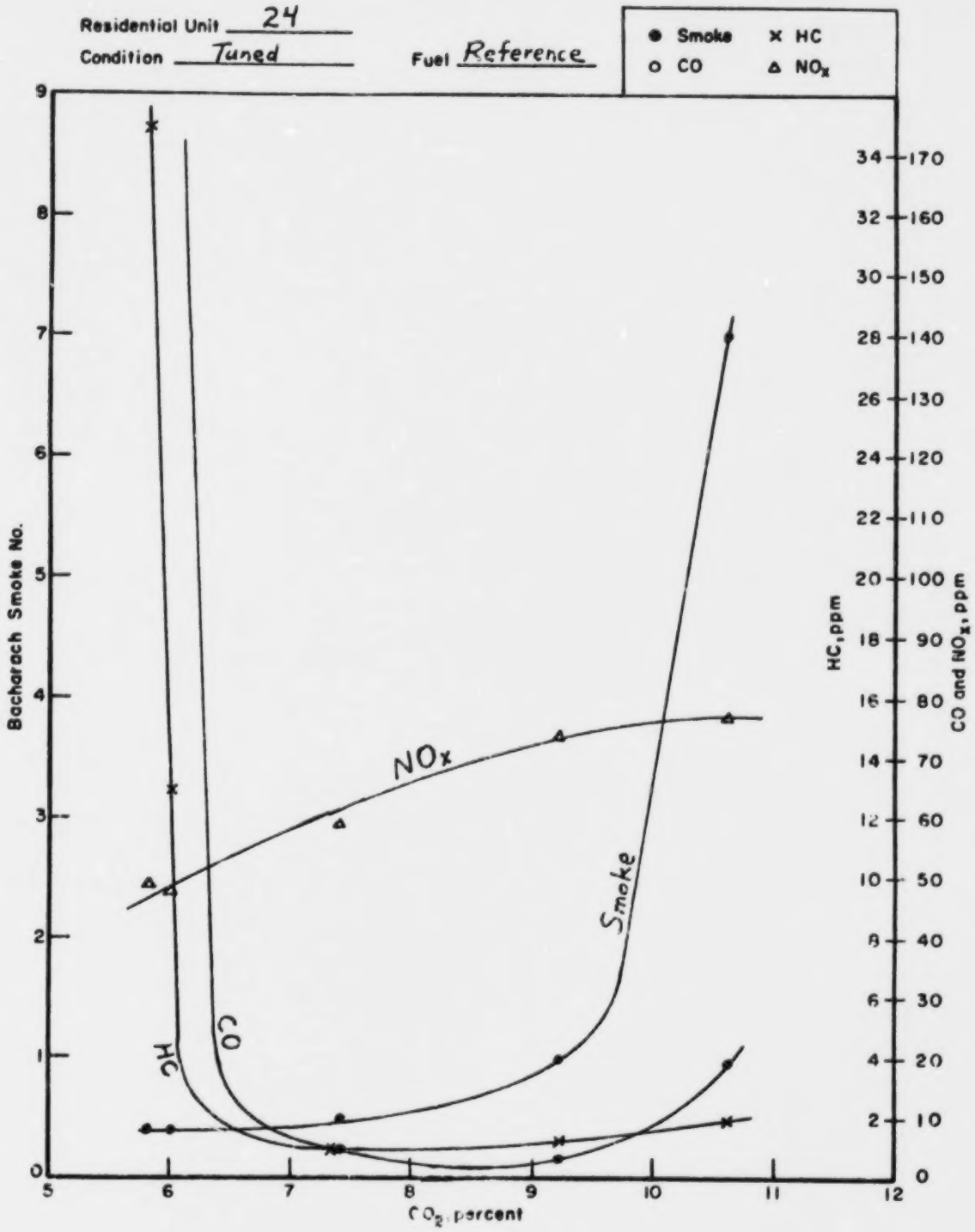
Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	House	0.6	5.9	13.3		1052.	40.	15.	82.
		0.4	6.2	12.8		441.	15.0	25.	88.
		1.0	7.9	10.3		4.	1.0	54.	76.
		5.3	8.8	9.1		3.	0.5	56.	78.
Tuned	House	0.0	5.9	12.9		372.	3.0	16.	51.
		0.0	6.1	12.5		146.	0.5	35.	53.
		0.0	6.4	12.2		39.	0.5	38.	54.
		1.8	9.3	8.0		0	1.0	72.	80.
		5.9	10.1	7.2		4.	2.0	73.	80.
Tuned	Reference	0.4	5.8	13.0		762.	35.	17.	49.
		0.4	6.0	12.8		422.	13.0	19.	48.
		0.5	7.4	10.7		5.	1.0	60.	59.
		1.0	9.2	8.2		3.	1.4	75.	74.
		7.0	10.6	6.2		19.	2.0	79.	77.



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 25

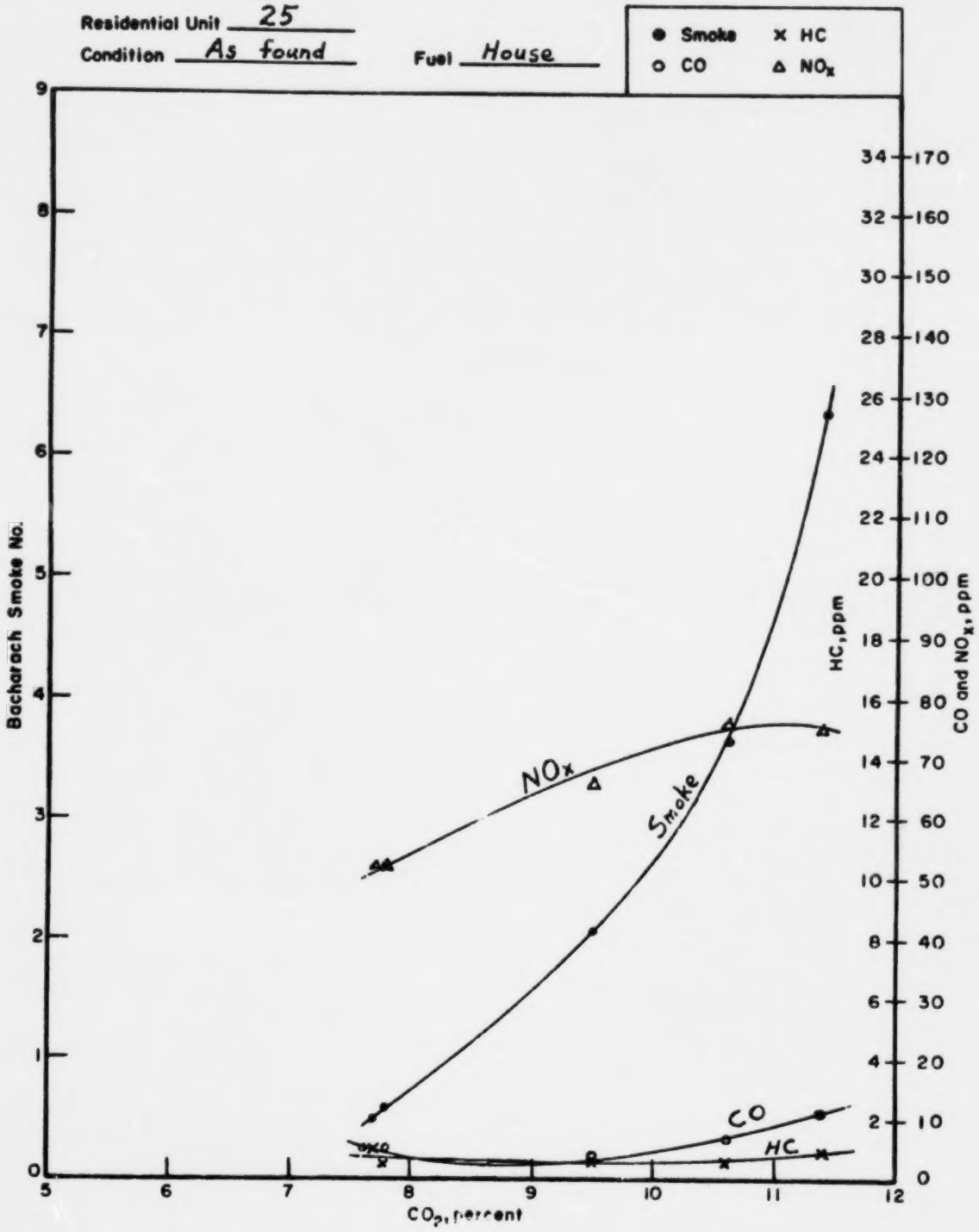
Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m^3[c]	
		Smoke No[a]	CO_2,%[b]	O_2,%[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	1.0 (1.2)	8.4	9.0	10.6	5.4	42.	56.	1.7	21.0
Tuned	"	1.7 (1.4)	9.4	7.3	8.6	5.9	47.	47.	4.4	15.3
"	Reference	2.[illegible] (0.7)	8.5	8.8	12.1	5.7	44.	49.	4.4	12.8
Second visit	House	0.4 (0.7)	10.8	6.6	15.5	8.6	49.	47.	–	–
" "	Reference	0.1 (0.2)	10.9	6.5	14.7	5.9	54.	48.	–	–
Third visit	House	4.1 (4.1)	9.1	8.4	10.3	22.7	38.	36.	–	–
" "	Reference	5.3 (5.7)	10.1	7.0	11.8	22.0	37.	39.	64.7	96.6

(a) At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).
(b) Average for "on" period of cycle.
(c) Based on sample collected during six 10-minute cycles.

SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 25

Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	House	0.5	7.7	9.8		5.	1.0	40.	52.
		0.6	7.8	9.6		5.	0.5	40.	52.
		2.1	9.5	7.1		4.	0.5	51.	66.
		3.7	10.6	5.6		7.	0.5	56.	76.
		6.4	11.4	4.3		11.	1.0	55.	75.
Tuned	House	0.4	9.1	8.0		1.	0.8	50.	50.
		0.6	9.3	7.8		1.	1.2	48.	49.
		1.8	9.5	7.5		1.	2.2	48.	49.
		1.3	9.7	7.0		3.	0.3	51.	51.
		4.0	10.6	6.0		2.	0.7	49.	48.
		6.6	11.6	4.2		14.	1.2	48.	48.
Tuned	Reference	0.5	8.6	8.3		7.	1.0	48.	49.
		0.7	8.9	7.9		7.	1.0	49.	49.
		1.9	9.4	7.1		8.	1.0	52.	50.
		2.0	9.6	6.7		8.	0.7	52.	50.
		1.4	9.9	6.3		9.	1.0	52.	51.
		4.1	11.1	4.5		18.	1.5	49.	55.



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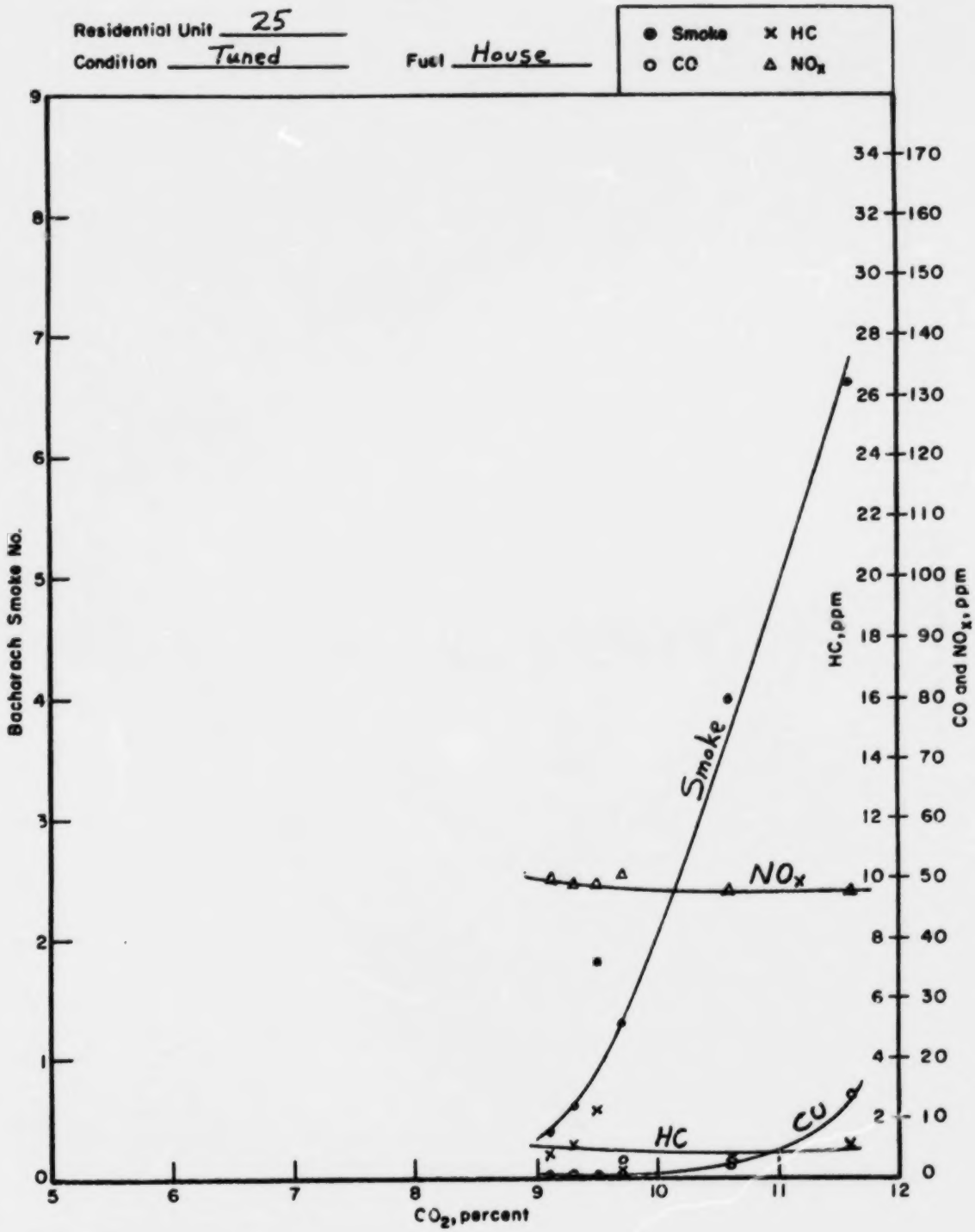

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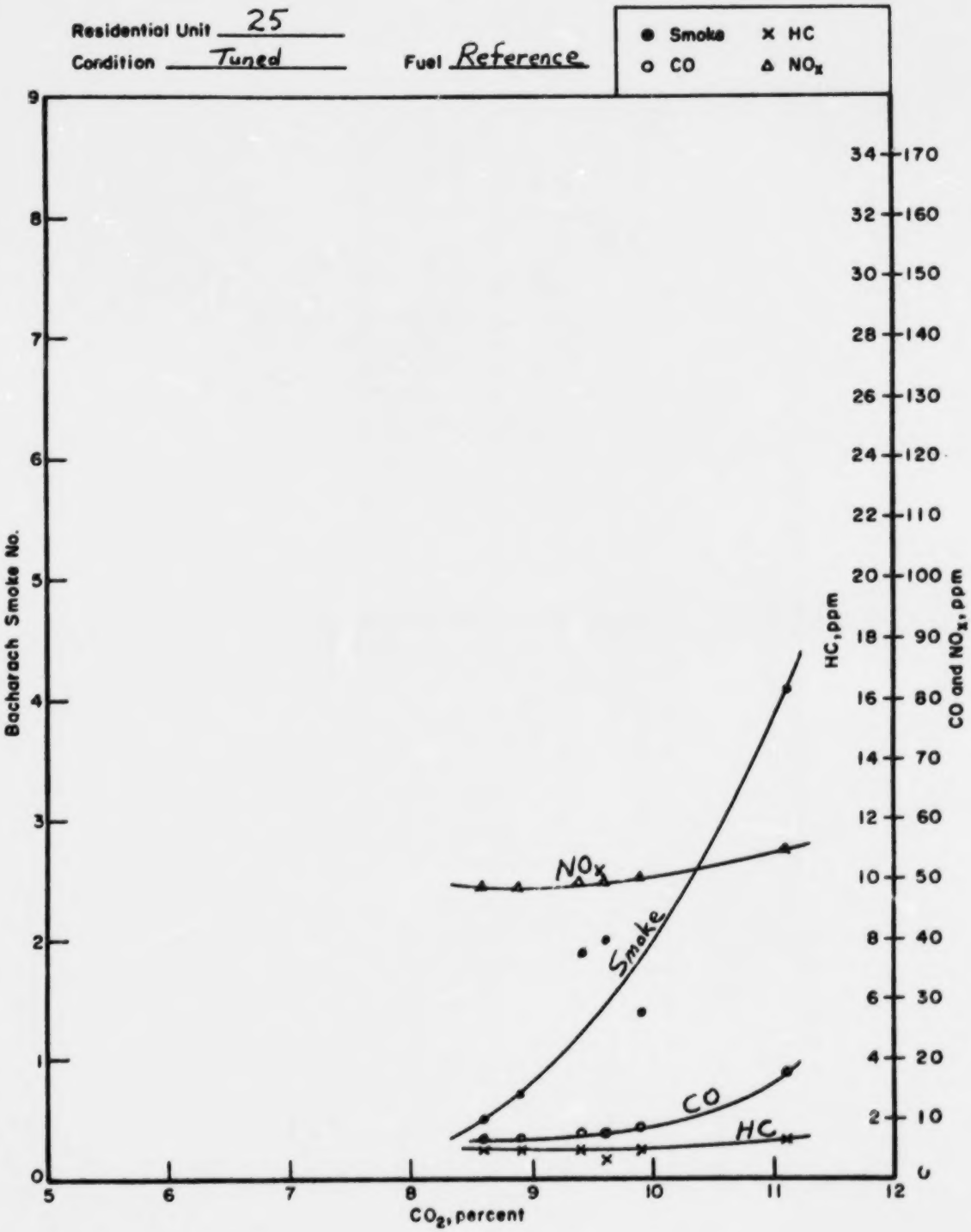


SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 26

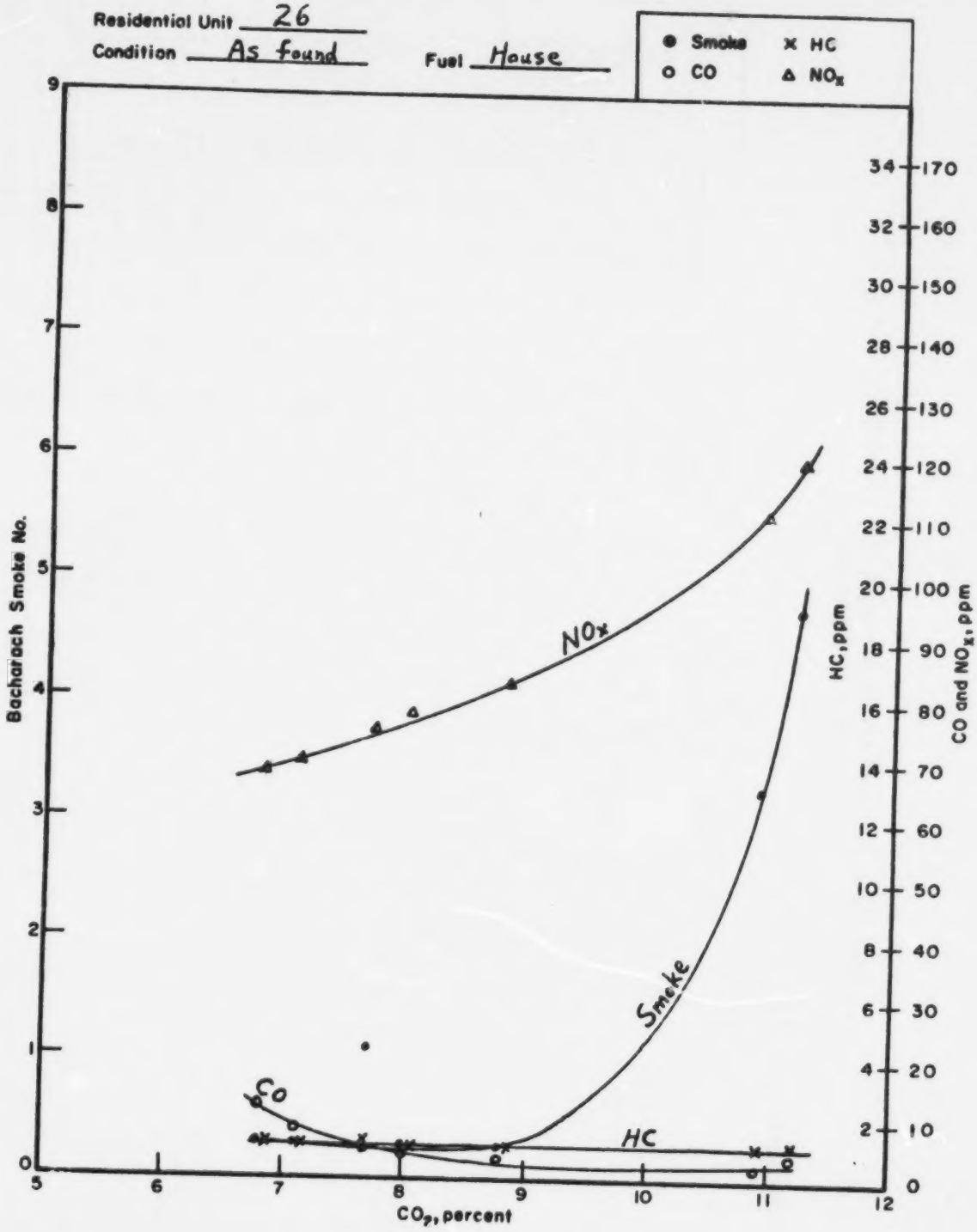
Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m^3[c]	
		Smoke No.[a]	CO_2,%[b]	O_2,%[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	0.5 (0.4)	7.1	11.1	5.5	5.1	54.	64.	6.1	27.4
Tuned	"	0.4 (0.6)	8.7	9.1	6.0	4.0	68.	71.	6.7	14.5
	Reference	0.5 (0.4)	8.8	8.8	10.7	4.4	67.	72.	6.0	16.0
Second visit	House	0.2 (0.2)	9.4	8.2	6.9	6.8	69.	74.	–	–
" "	Reference	0.2 (0.2)	9.4	8.0	7.0	6.1	69.	73.	–	–
Third visit	House	0.5 (0.5)	9.2	8.2	5.5	7.8	66.	68.	–	–
" "	Reference	0.4 (0.3)	9.0	8.6	5.2	7.2	66.	67.	4.6	16.4

(a) *At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).*
(b) *Average for "on" period of cycles.*
(c) *Based on sample collected during six 10-minute cycles.*

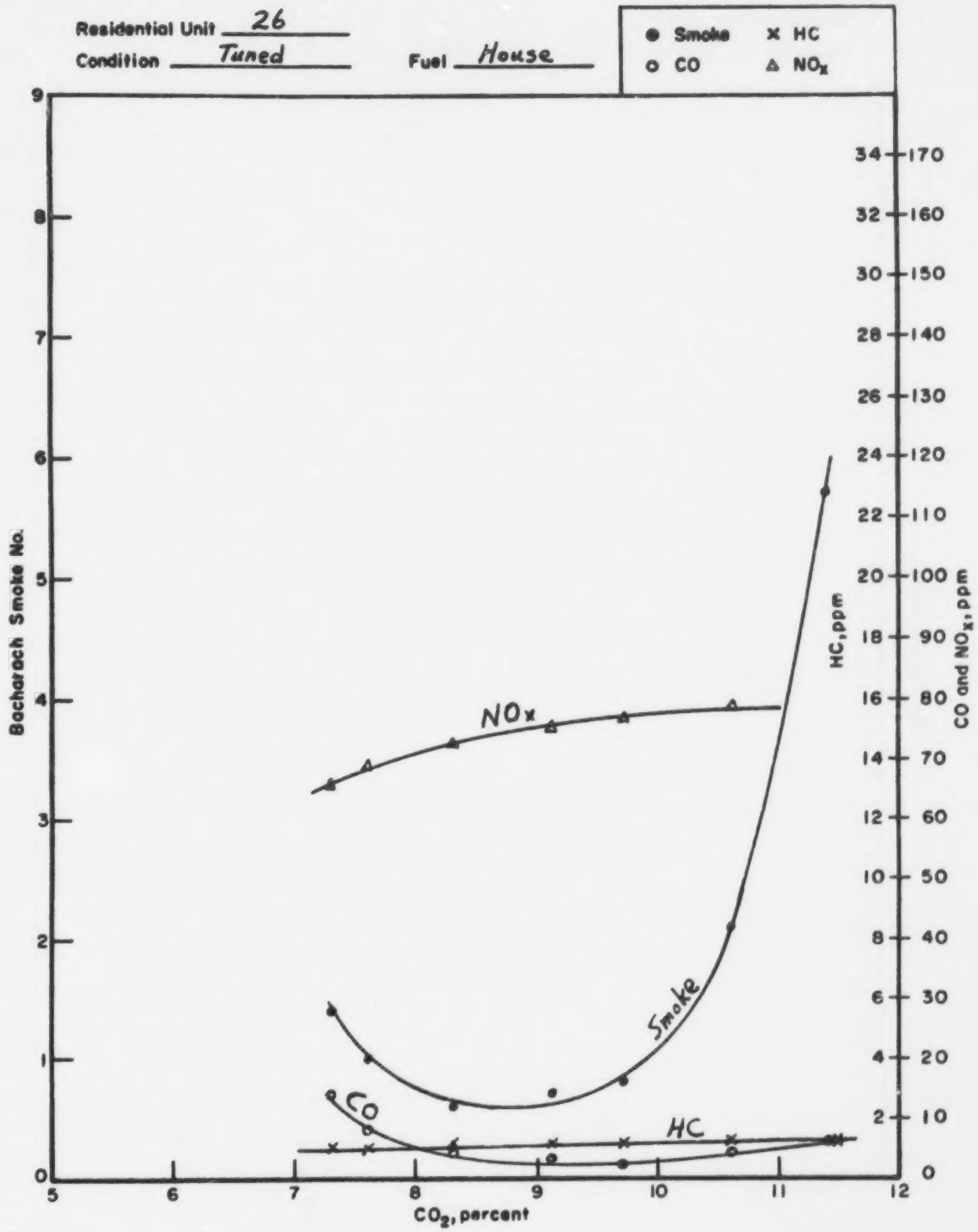
SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 26

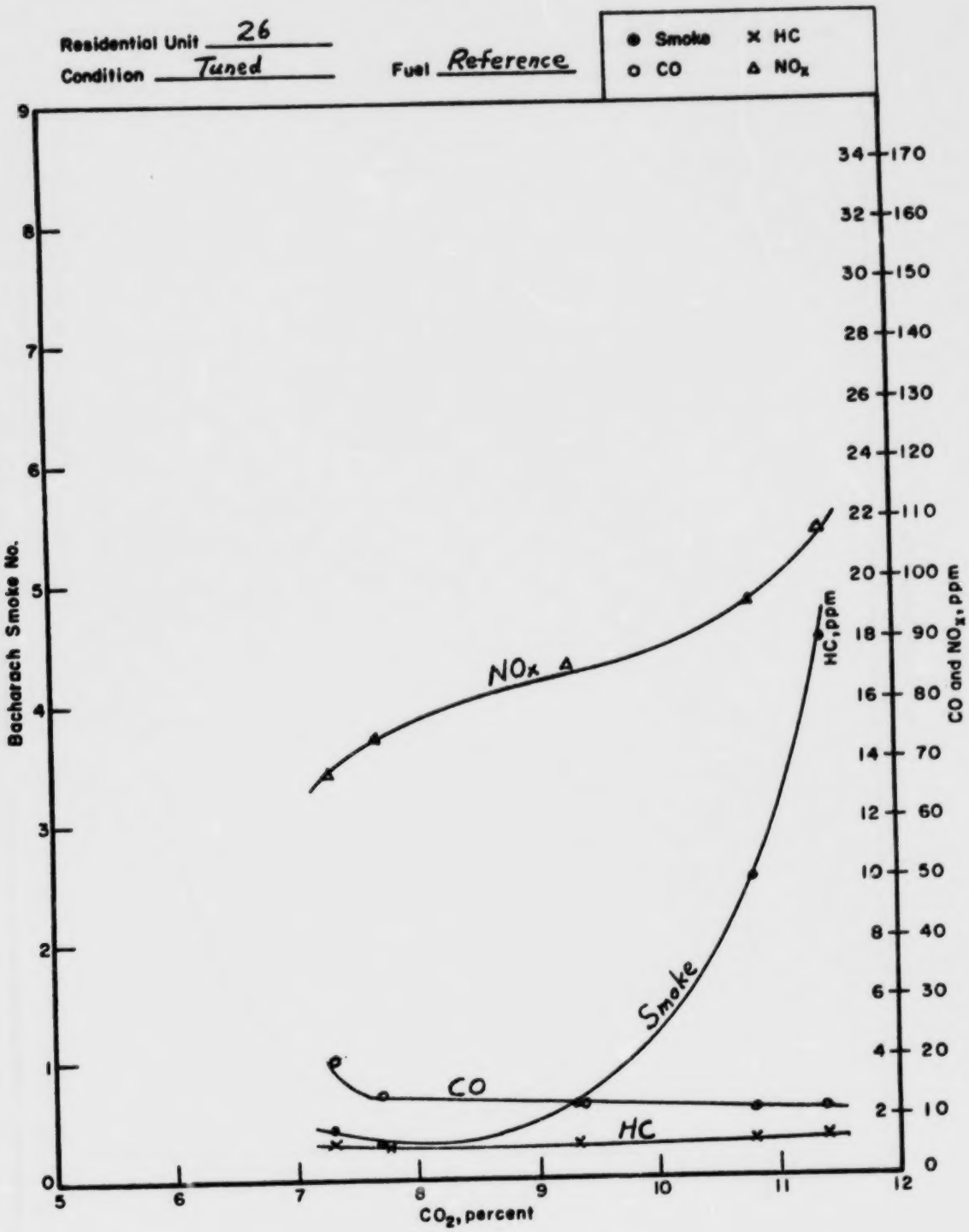
Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	House	0.3	6.8	11.5		12.	1.2	47.	68.
		0.3	7.1	11.1		8.	1.2	52.	70.
		1.1	7.7	10.2		5.	1.3	57.	75.
		0.3	8.0	9.7		4.	1.2	62.	78.
		0.3	8.8	8.5		3.	1.3	67.	83.
		3.3	10.9	5.3		2.	1.3	80.	111.
		4.8	11.2	4.8		4.	1.4	83.	120.
Tuned	House	1.4	7.3	11.3		14.	1.0	55.	66.
		1.0	7.6	10.6		8.	1.0	63.	69.
		0.6	8.3	9.5		4.	1.2	70.	73.
		0.7	9.1	8.5		3.	1.2	76.	75.
		0.8	9.7	7.5		2.	1.2	79.	77.
		2.1	10.6	6.2		4.	1.3	85.	79.
		5.7	11.4	4.7		6.	1.3	–	–
Tuned	Reference	0.4	7.3	11.2		20.	1.2	54.	68.
		0.3	7.7	10.6		14.	1.1	60.	74.
		0.6	9.3	8.1		12.	1.1	71.	86.
		2.5	10.8	6.0		11.	1.2	77.	96.
		4.5	11.4	4.8		11.	1.3	81.	108.



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 27

Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m^3[c]	
		Smoke No[a]	CO_2,%[b]	O_2,%[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	1.0 (1.1)	9.1	8.1	11.6	3.3	66.	86.	9.3	33.1
Tuned		0.4 (0.4)	8.2	9.4	12.5	4.4	58.	78.	5.6	13.9
"	Reference	0.3 (0.4)	8.1	9.5	11.1	7.3	62.	69.	—	—
Second visit	House									
" "	Reference									
Third visit	House									
" "	Reference									

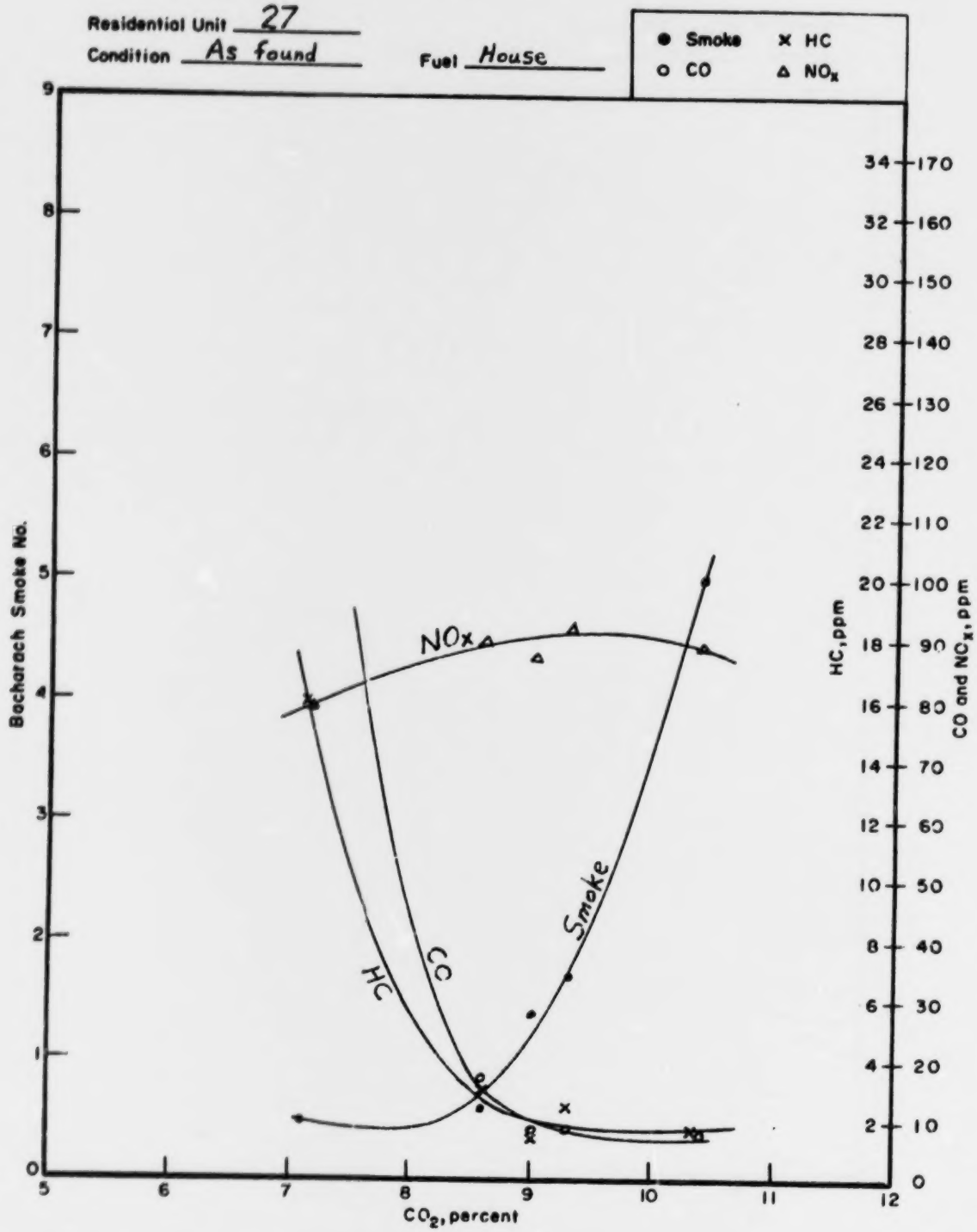
(a) At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).
(b) Average for "on" period of cycles.
(c) Based on sample collected during six 10-minute cycles.

SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

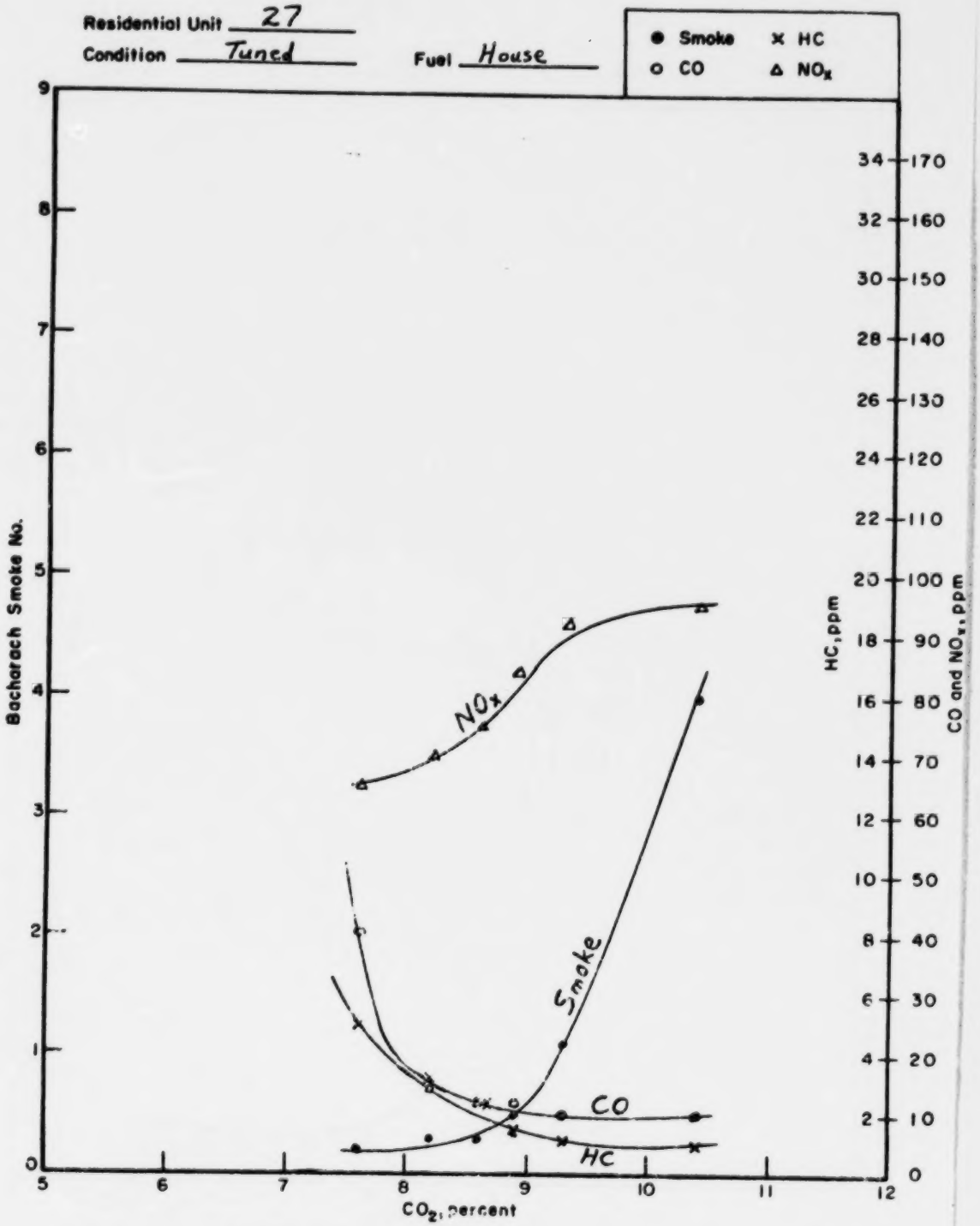
Residential Unit 27

Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	House	0.5	7.1	11.2		190.	16.0	42.	79.
		0.6	8.6	9.3		17.	3.0	72.	90.
		1.4	9.0	8.6		9.	1.5	76.	87.
		1.7	9.3	8.0		9.	2.5	78.	92.
		5.0	10.4	6.8		8.	1.7	78.	89.
Tuned	House	0.2	7.6	10.6		41.	5.0	55.	65.
		0.3	8.2	9.7		14.	3.2	63.	70.
		0.3	8.6	9.3		12.	2.4	70.	75.
		0.5	8.9	8.7		12.	1.5	79.	84.
		1.1	9.3	8.0		10.	1.2	89.	92.
		4.0	10.4	6.7		10.	1.0	94.	95.
Tuned	Reference	0.3	7.2	10.8		26.	4.0	46.	58.
		0.4	7.7	9.8		10.	2.2	59.	66.
		0.7	8.0	9.4		9.	1.4	64.	73.
		4.3	8.6	8.7		7.	–	75.	84.
		8.4	9.7	7.0		19.	–	83.	94.

Residential Unit 27
Condition As found
Fuel House



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

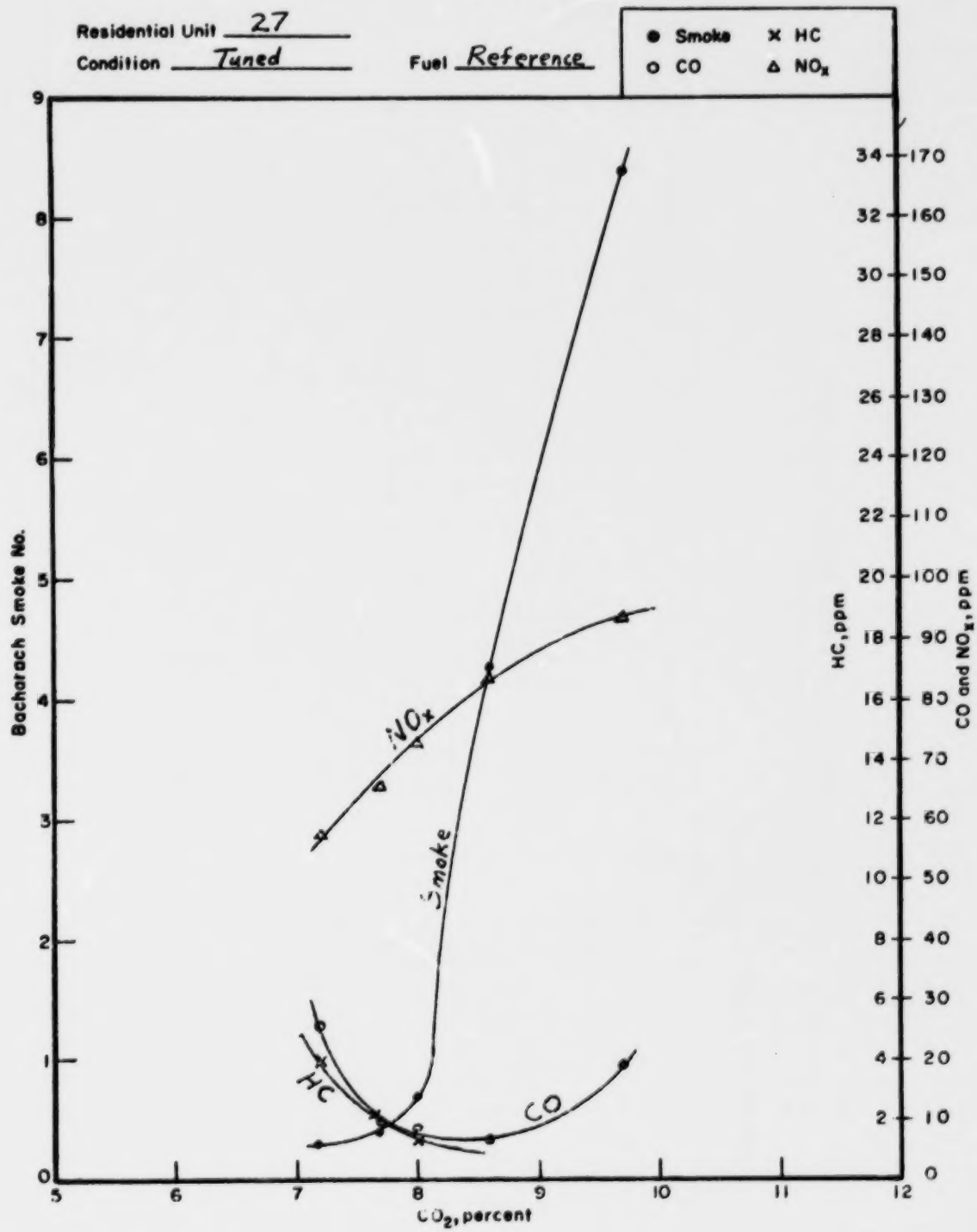


SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 27

Condition Tuned

Fuel Reference



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 28

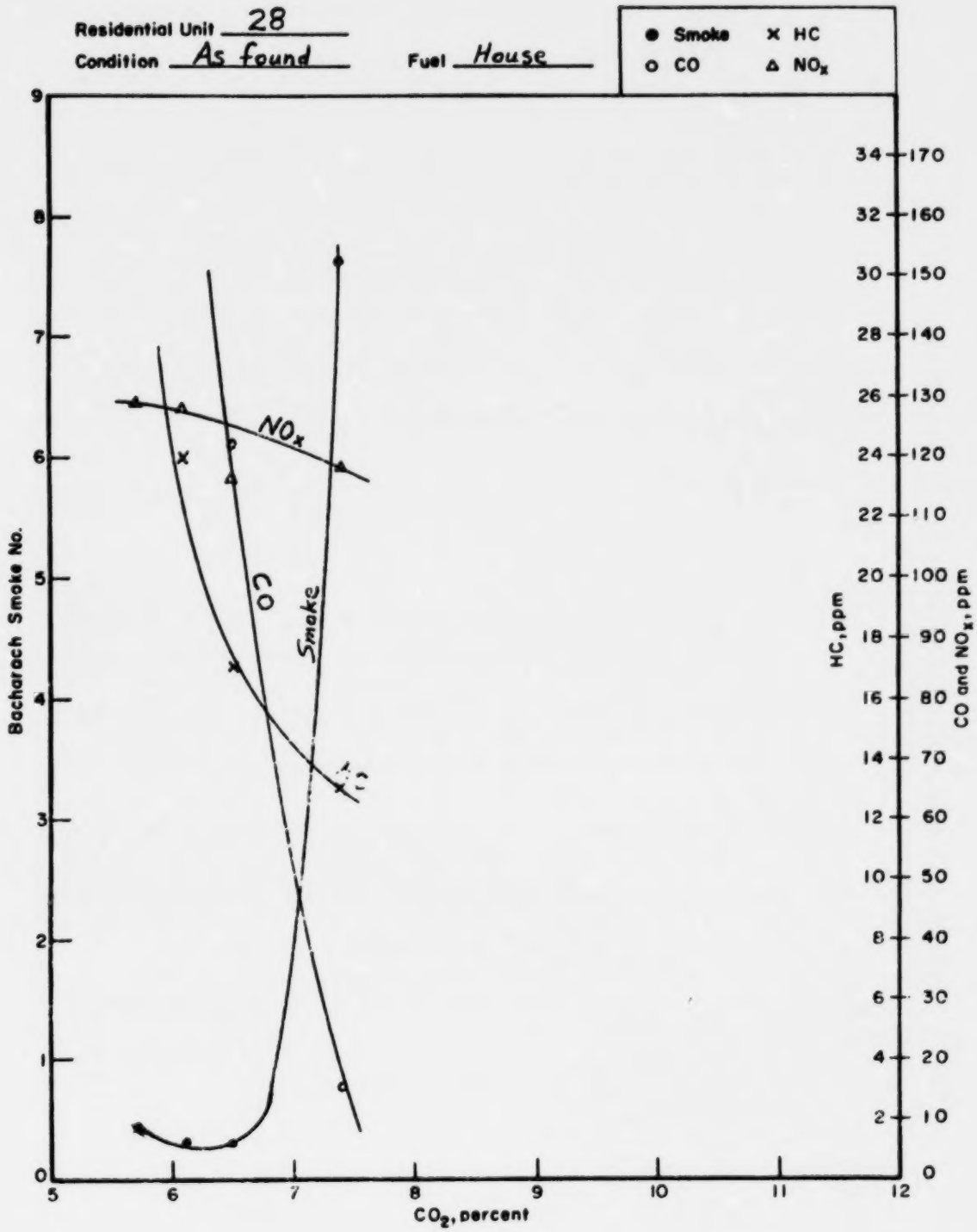
Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m^3[c]	
		Smoke No.[a]	CO_2 %[b]	O_2 %[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	1.3 (0.6)	6.6	11.9	162.	13.1	31.	79.	9.7	33.6
Tuned	"	0.4 (0.4)	7.4	10.3	8.6	1.8	60.	62.	3.2	13.5
	Reference	0.1 (0.4)	7.7	9.8	8.9	4.7	61.	76.	–	–
Second visit	House									
"	Reference									
Third visit	House									
"	Reference									

(a) At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).
(b) Average for "on" period of cycles.
(c) Based on sample collected during six 10-minute cycles.

SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 28

Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke.No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	House	0.4	5.7	12.8		>1240.	125.	9.	129.
		0.3	6.1	12.3		712.	24.0	22.	128.
		0.3	6.5	11.8		122.	17.0	30.	116.
		7.6	7.4	10.2		15.	13.0	58.	118.
Tuned	House	0.0	7.3	10.6	595	12.	3.4	39.	50.
		0.0	7.6	10.0	625	5.	3.2	54.	58.
		0.0	7.8	9.5	625	4.	3.2	61.	65.
		0.0	7.9	9.5	625	5.	3.2	62.	66.
		0.2	8.1	9.0	625	7.	3.0	61.	68.
		–	8.4	8.7	620	7.	3.2	64.	70.
		1.0	8.7	8.4	605	7.	3.2	65.	72.
Tuned	Reference	0.0	7.1	10.5	620	19.	4.0	45.	64.
		0.0	7.3	10.2	630	8.	3.5	56.	69.
		0.0	7.3	10.2	640	8.	2.5	63.	70.
		0.3	7.6	9.8	640	7.	2.3	66.	80.
		0.3	7.6	9.7	630	8.	2.3	67.	80.
		0.0	7.9	9.3	625	7.	2.3	69.	83.
		0.4	8.0	9.3	620	7.	2.3	68.	83.

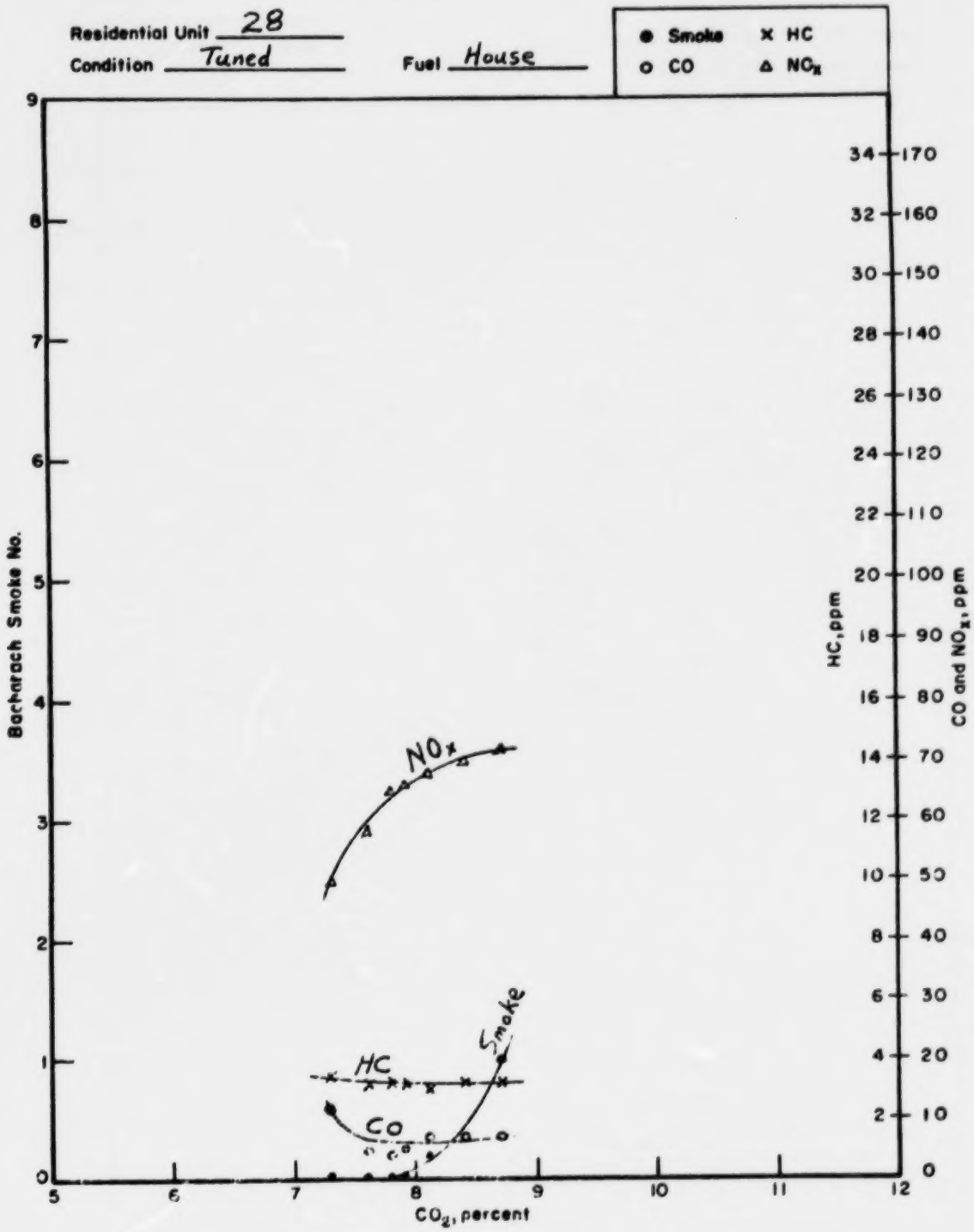


SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 28

Condition Tuned

Fuel House

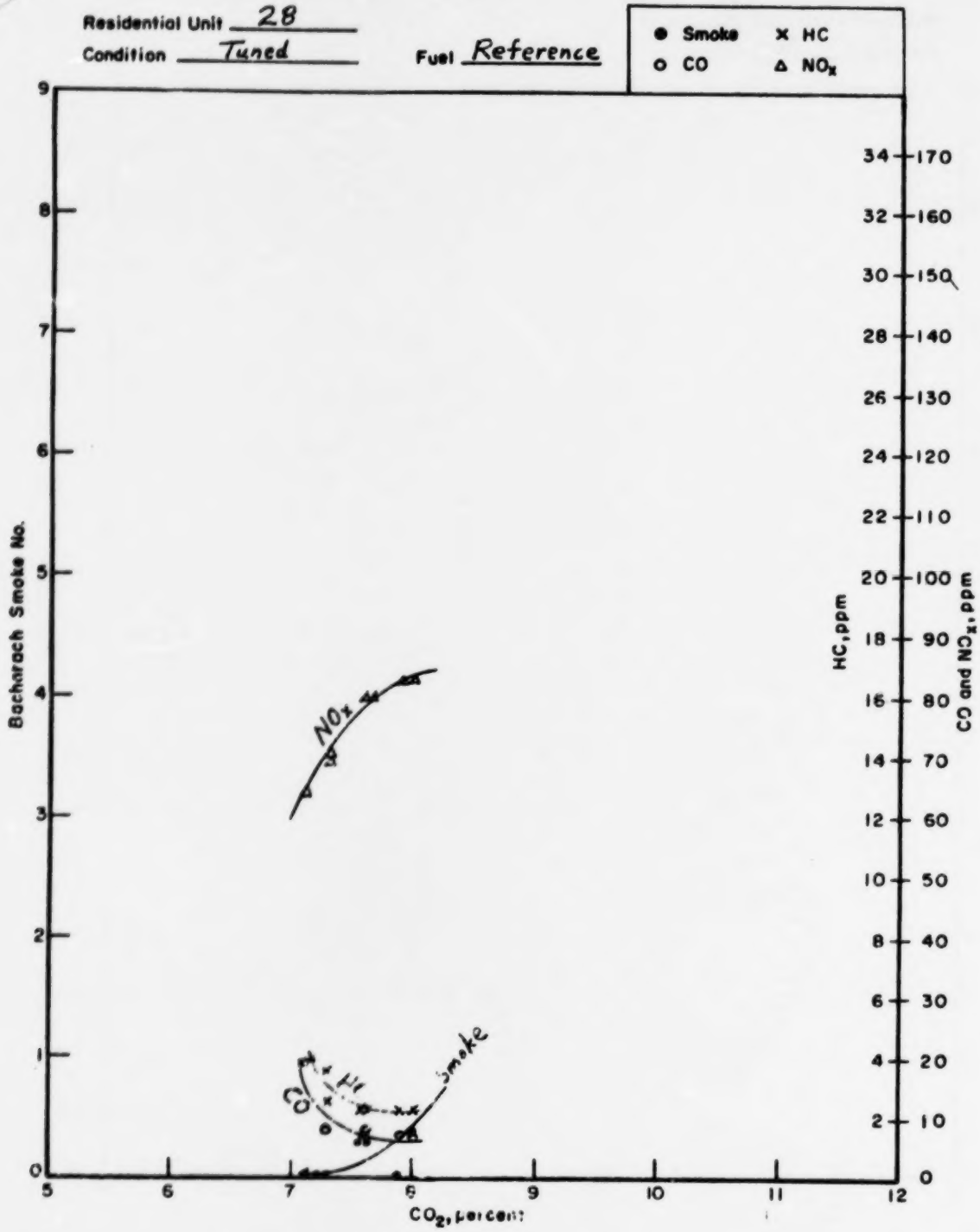


SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 28

Condition Tuned

Fuel Reference



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 29

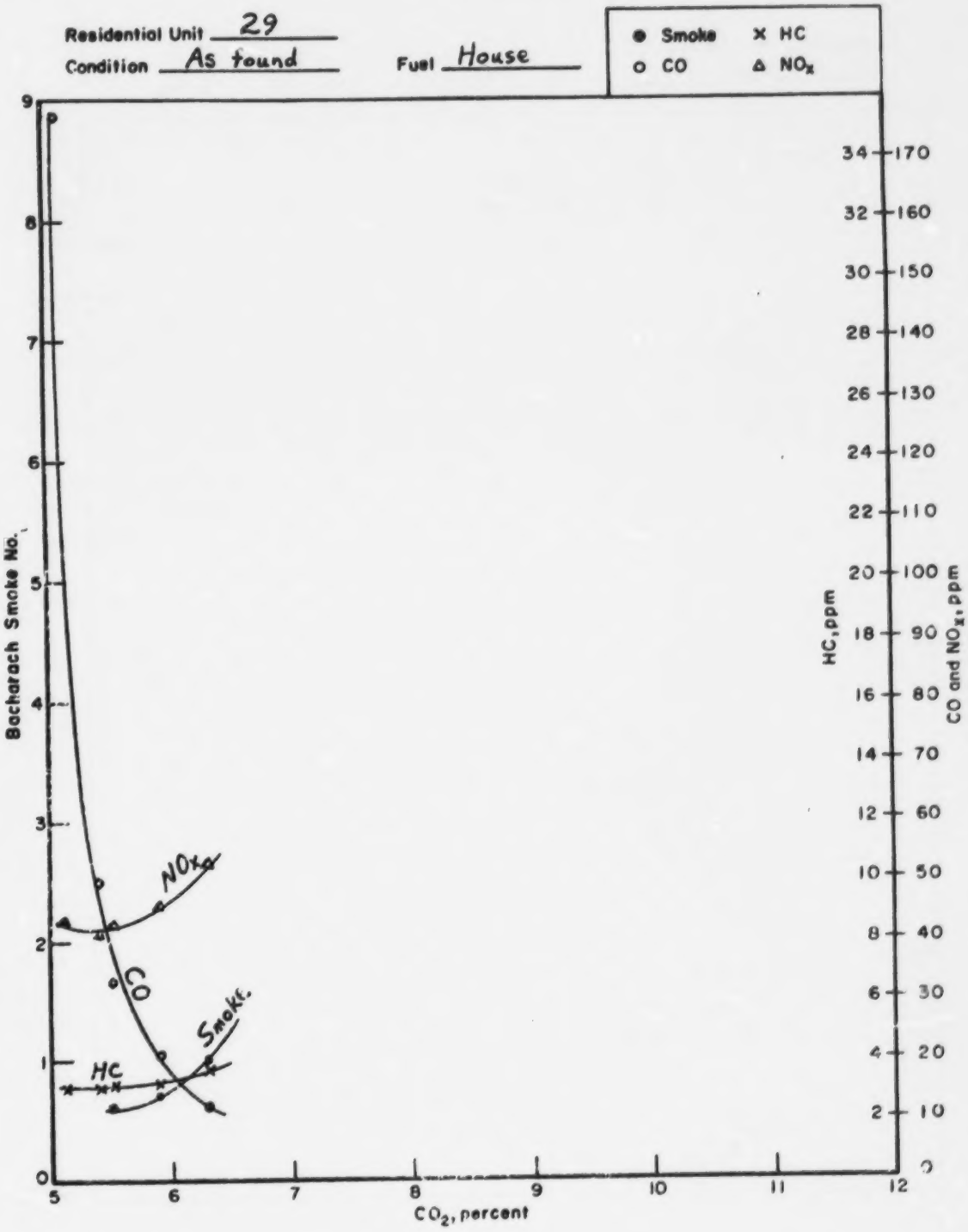
Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m^3[c]	
		Smoke No.[a]	CO_2, %[b]	O_2, %[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	9.0 (9.0)	9.4	7.1	24.7	4.4	81.	83.	14.4	76.0
Tuned	"	0.5 (0.7)	7.9	9.7	12.3	4.2	63.	65.	36.3	56.8
"	Reference	0.3 (0.6)	7.7	9.1	13.6	25.0	64.	74.	-	
Second visit	House									
"	Reference									
Third visit	House									
" "	Reference									

(a) At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).
(b) Average for "on" period of cycles.
(c) Based on sample collected during six 10-minute cycles.

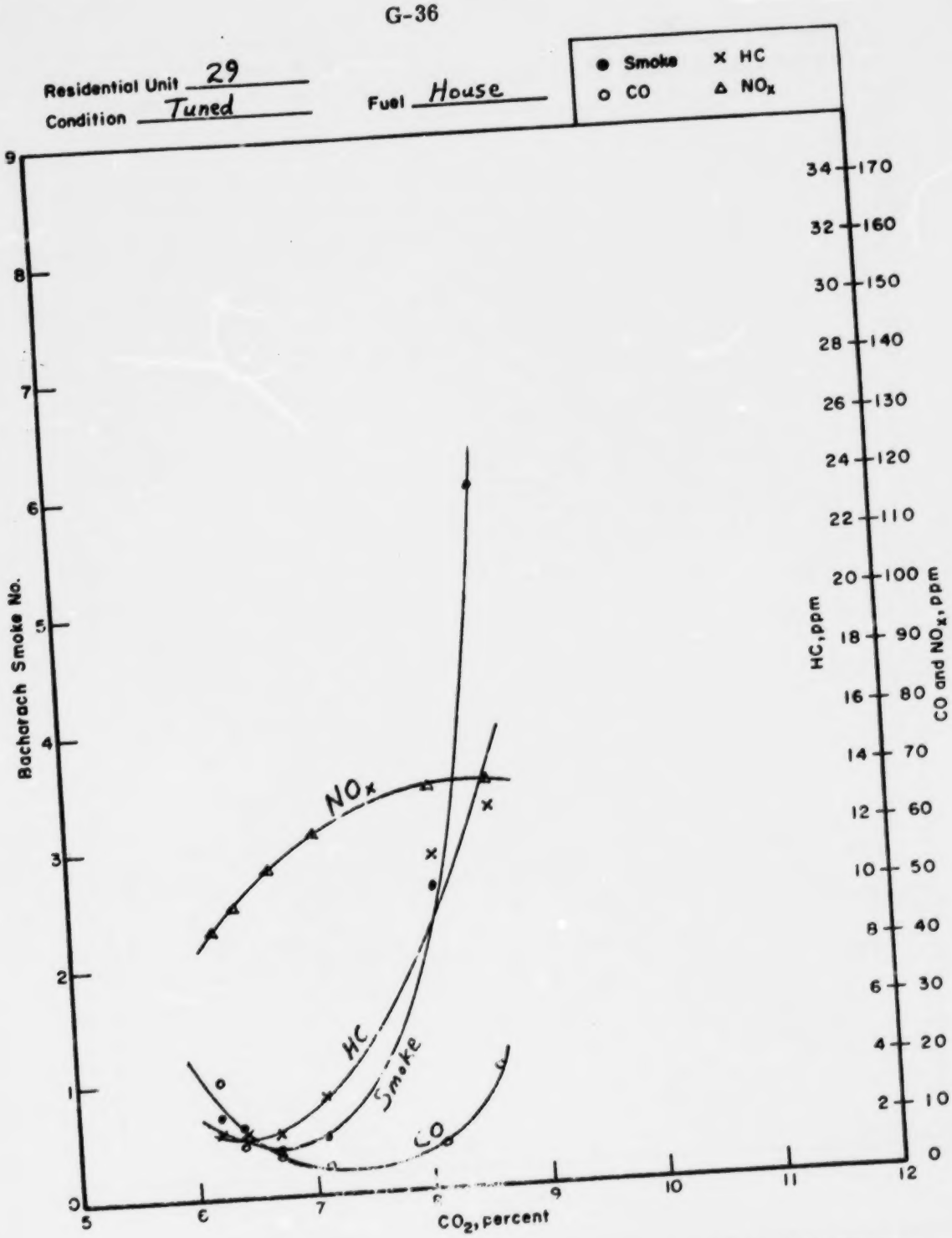
SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 29

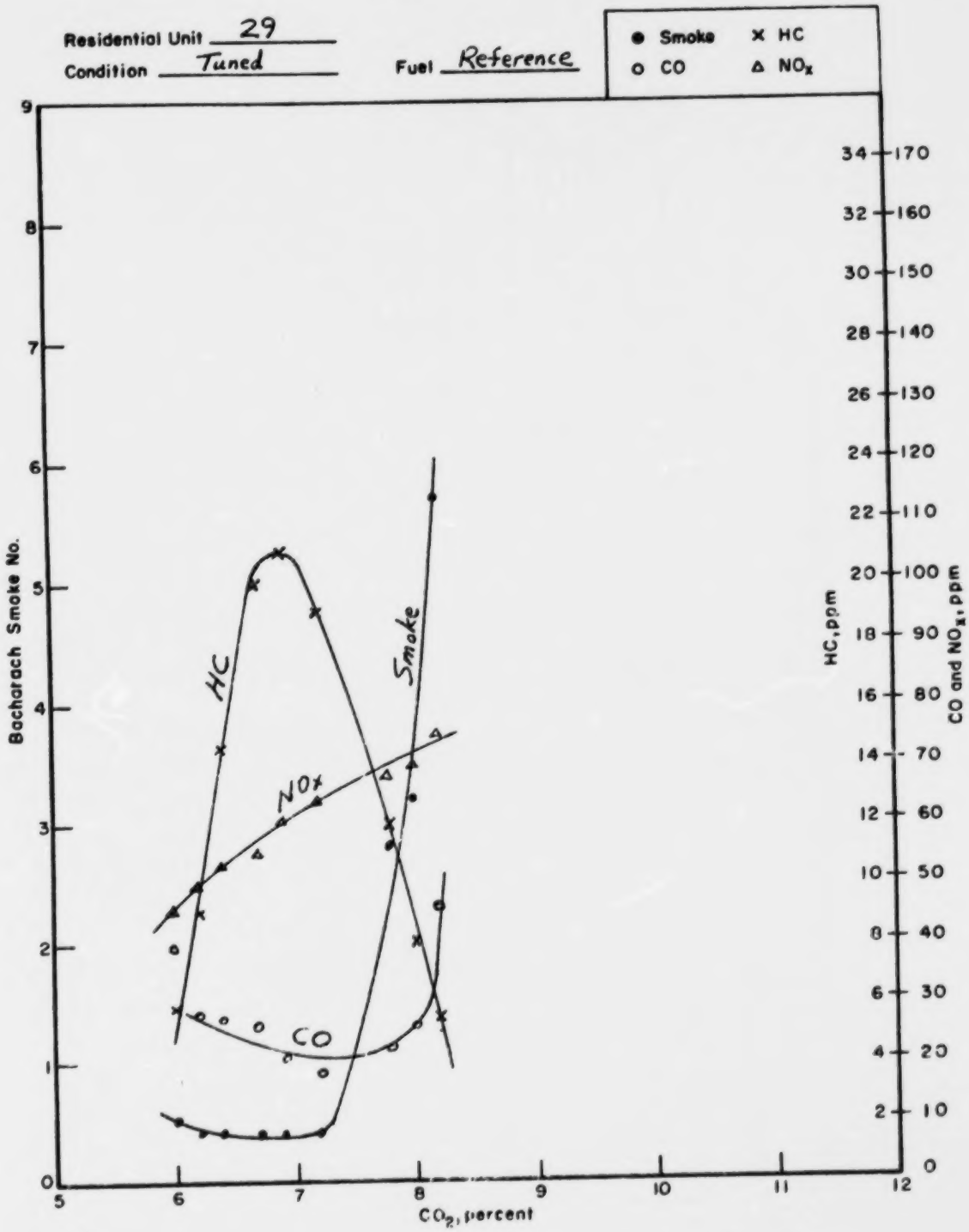
Unit Condition	Fu	Combustion Conditions			Stack Temperature,	Gaseous Emissions, ppm			
		Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	Home	–	4.8	13.8		>1240.	>100.	7.	46.
		0.1	4.9	13.7		683.	3.5	9.	45.
		0.1	5.1	13.5		173.	3.0	19.	43.
		–	5.4	13.2		50.	3.0	32.	41.
		0.6	5.5	13.0		33.	3.1	38.	43.
		0.7	5.9	12.4		21.	3.2	47.	46.
		1.0	6.3	11.8		12.	3.7	53.	53.
Tuned	Home	0.7	6.2	12.3		20.	2.2	40.	46.
		0.6	6.4	11.8		9.	2.2	46.	50.
		0.4	6.7	11.3		7.	2.2	55.	56.
		0.5	7.1	10.6		5.	3.3	61.	62.
		2.6	8.1	9.0		8.	11.5	66.	69.
		6.0	8.6	8.4		21.	13.0	69.	70.
Tuned	Reference	0.5	6.0	12.1		39.	6.6	36.	46.
		0.4	6.2	11.8		28.	9.0	40.	50.
		0.4	6.4	11.5		27.	14.5	45.	53.
		0.4	6.7	11.0		26.	20.0	51.	55.
		0.4	6.9	10.4		21.	21.0	56.	61.
		0.4	7.2	9.8		18.	19.0	60.	64.
		2.8	7.8	8.7		22.	12.0	64.	68.
		3.2	8.0	8.4		26.	8.0	67.	70.
		5.7	8.2	7.8		46.	5.5	71.	75.



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 30

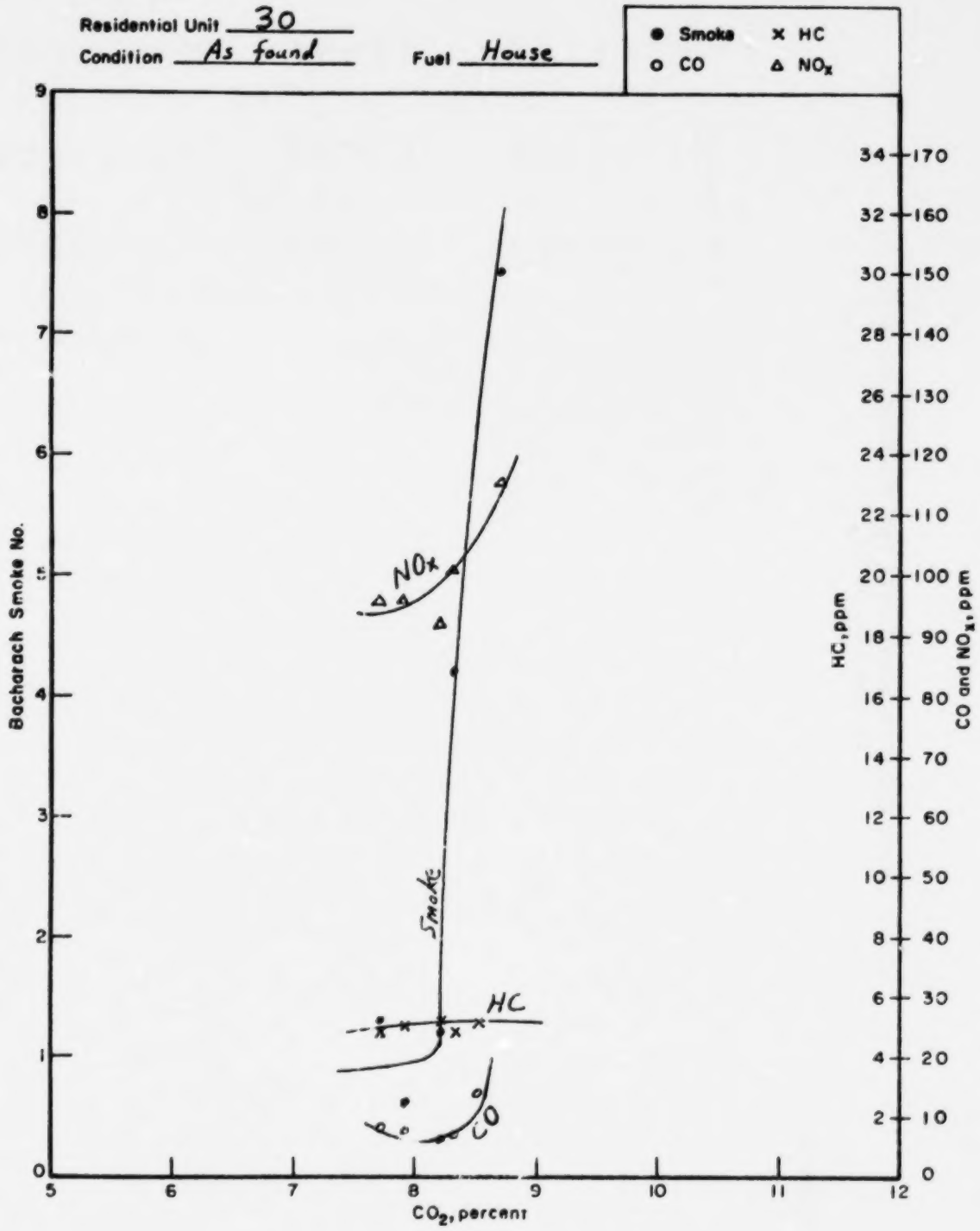
Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m³[c]	
		Smoke No.[a]	CO_2 %[b]	O_2 %[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	0.2 (0.2)	7.5	10.3	117	3.2	68.	79.	5.8	29.5
Tuned	"	0.6 (1.1)	7.1	11.1	170[d]	9.4	44.	65.	6.1	27.8
"	Reference	0.3 (0.4)	6.9	11.4	200[d]	10.7	37.	58.	–	–
Second visit	House									
"	Reference									
Third visit	House									
"	Reference									

(a) At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).
(b) Average for "on" period of cycles.
(c) Based on sample collected during six 10-minute cycles.
(d) "On" puff was off scale, i.e., >1250 ppm.

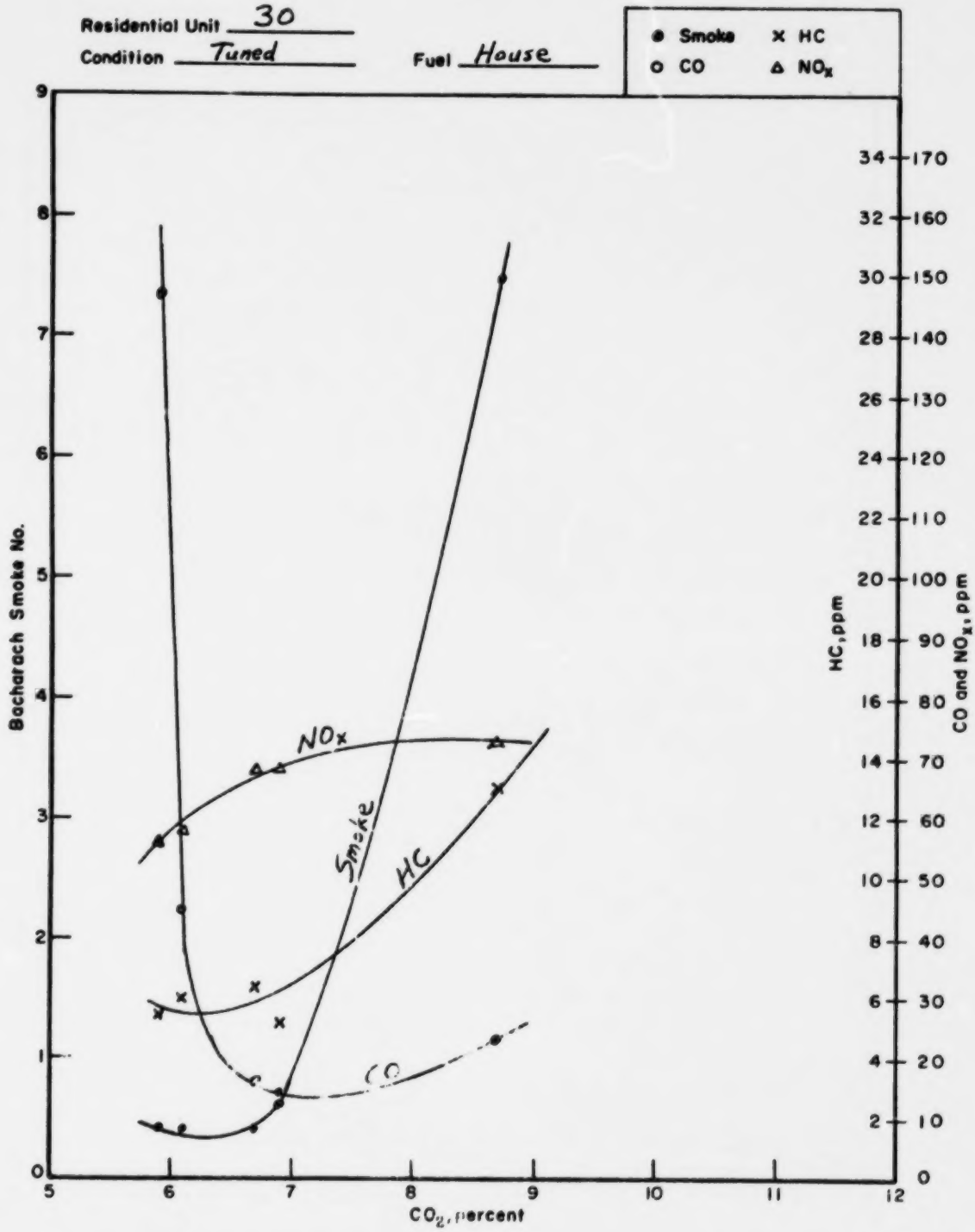
SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 30

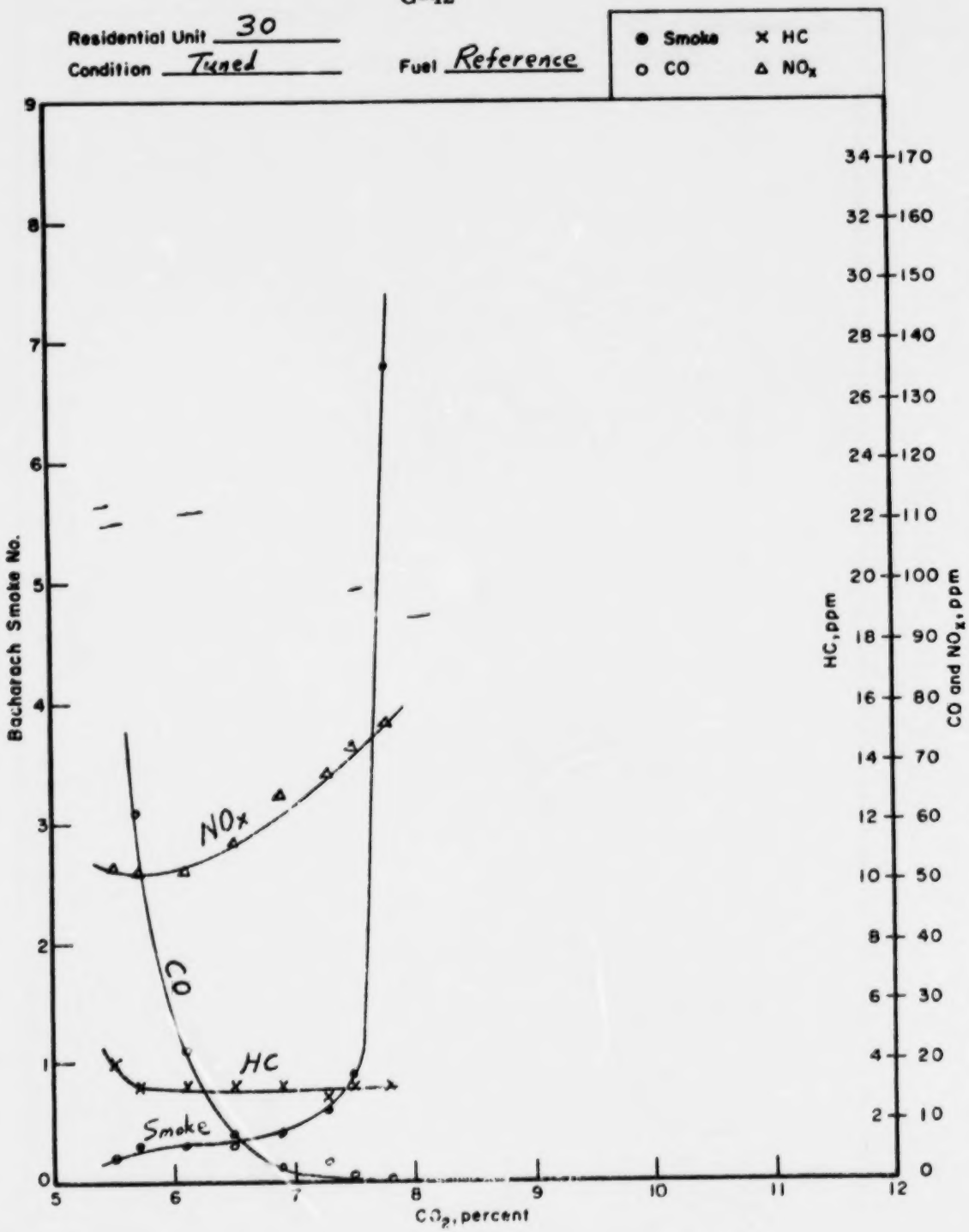
Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	Hou.	1.3	7.7	9.8		8.	4.8	76.	96.
		0.6	7.9	9.7		7.	5.0	75.	96.
		1.2	8.2	9.4		6.	5.2	73.	92.
		4.2	8.3	9.1		7.	4.8	76.	101.
		7.5	8.7	8.5		14.	5.2	77.	115.
Tuned	Ho.	0.4	5.9	12.5		147.	5.5	26.	56.
		0.4	6.1	12.1		45.	6.0	34.	58.
		0.4	6.7	11.3		16.	6.4	49.	68.
		0.7	6.9	11.0		12.	5.2	54.	68.
		7.5	8.7	8.2		23.	13.0	56.	73.
Tuned	Reference	0.2	5.5	12.8		302.	4.0	7.	53.
		0.3	5.7	12.3		62.	3.2	20.	52.
		0.3	6.1	11.9		22.	3.2	32.	52.
		0.4	6.5	11.4		6.	3.2	43.	57.
		0.4	6.9	10.8		2.	3.2	54.	65.
		0.6	7.3	10.2		3.	2.8	59.	68.
		0.9	7.3	10.2		1.	3.2	64.	73.
		6.8	7.8	9.5		0.	3.2	68.	77.



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 31

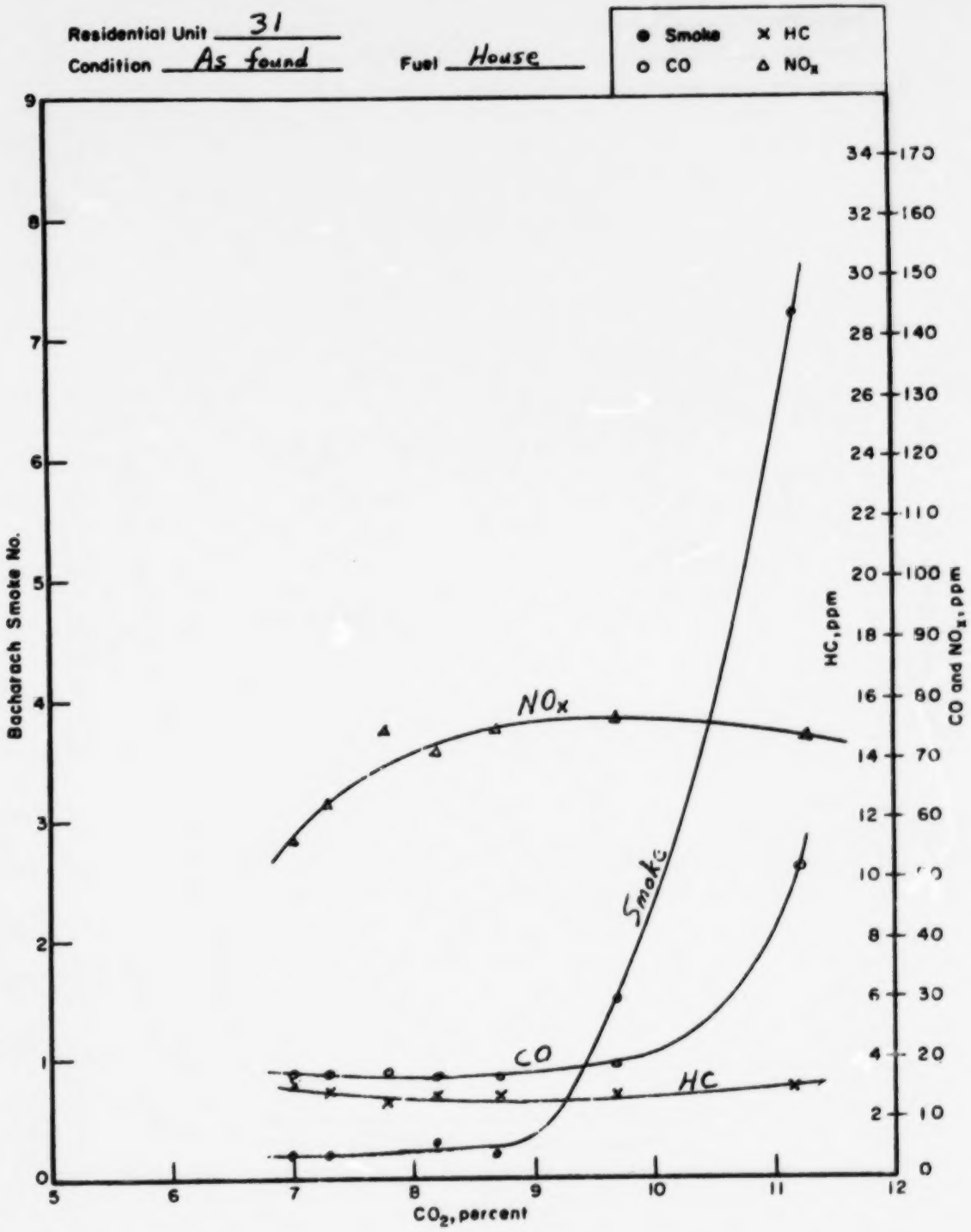
Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m^3[c]	
		Smoke No.[a]	CO_2, %[b]	O_2, %[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	0.0 (0.0)	7.9	10.5	36.1	3.8	61.	68.	4.6	30.0
Tuned	"	0.2 (0.2)	9.9	7.9	6.4	2.4	83.	87.	9.1	71.2
"	Reference	0.2 (0.3)	9.6	8.0	4.7	2.4	85.	89.	–	–
Second visit	House									
"	Reference									
Third visit	House									
" "	Reference									

(a) At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).
(b) Average for "on" period of cycles.
(c) Based on sample collected during six 10-minute cycles.

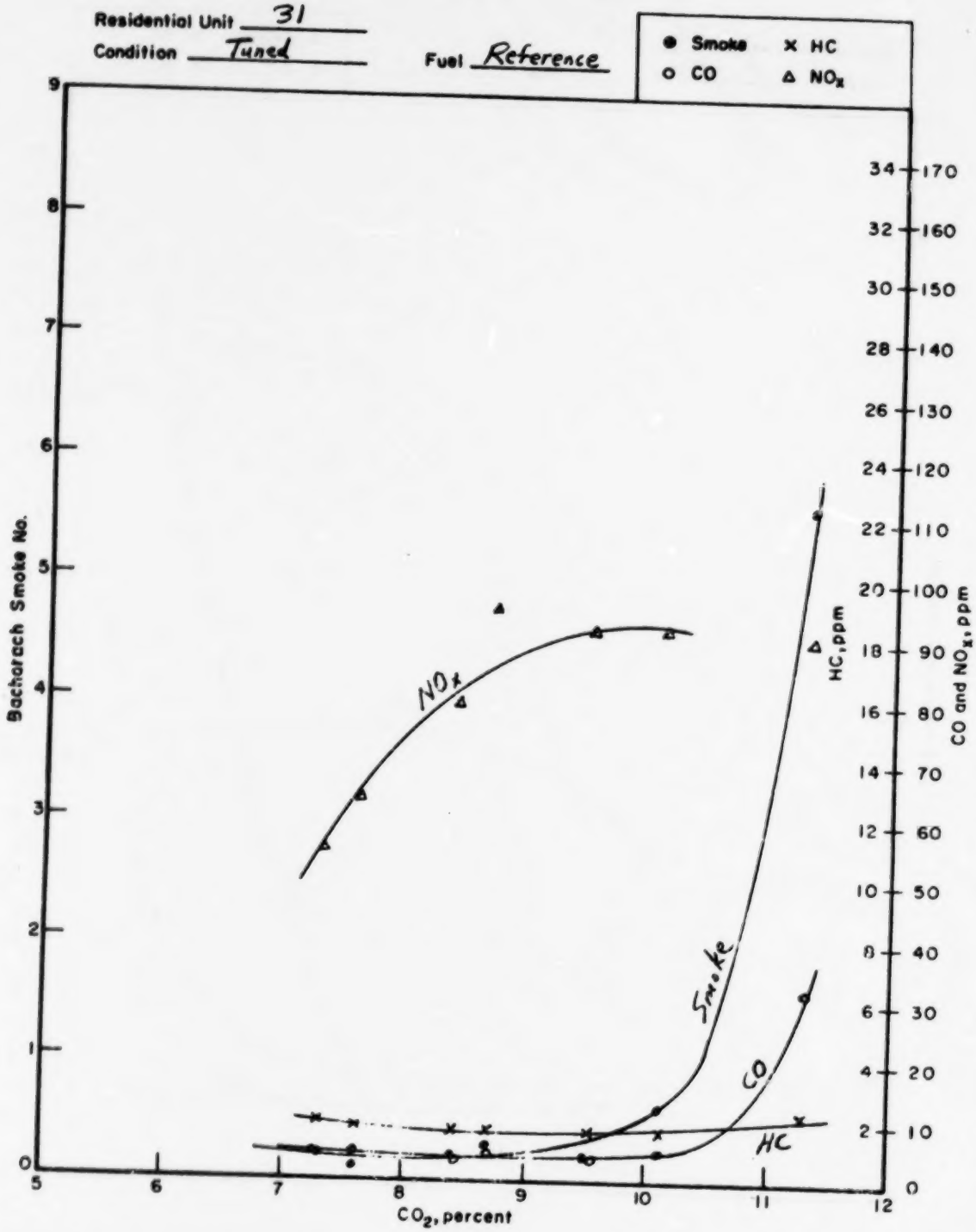
SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 31

Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke, N	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	House	0.2	7.0	11.9		18.	3.2	50.	57.
		0.2	7.3	11.4		18.	2.9	60.	63.
		–	7.8	10.8		18.	2.5	77.	75.
		0.3	8.2	10.4		17.	2.8	68.	71.
		0.2	8.7	9.6		17.	2.7	74.	75.
		1.5	9.7	8.3		19.	2.7	77.	77.
		7.2	11.2	6.3		52.	3.0	76.	74.
Tuned	House	0.3	7.4	11.2		3.	3.7	55.	58.
		0.2	7.7	10.7		4.	3.3	62.	67.
		0.3	8.3	9.9		3.	3.1	73.	78.
		0.3	9.2	8.6		4.	3.0	85.	89.
		–	9.3	8.4		4.	2.6	89.	92.
		0.3	9.6	7.9		3.	2.9	86.	90.
		1.4	10.6	6.7		4.	2.8	83.	85.
		5.3	11.3	5.7		22.	3.2	82.	82.
Tuned	Reference	0.2	7.3	11.4		5.	2.0	53.	55.
		0.1	7.6	10.8		5.	1.8	63.	64.
		0.2	8.4	9.8		4.	1.7	77.	80.
		0.3	8.7	9.0		5.	1.7	94.	95.
		0.2	9.5	8.1		4.	1.7	88.	91.
		0.6	10.1	7.2		5.	1.7	88.	91.
		5.6	11.3	5.5		32.	2.3	88.	90.



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

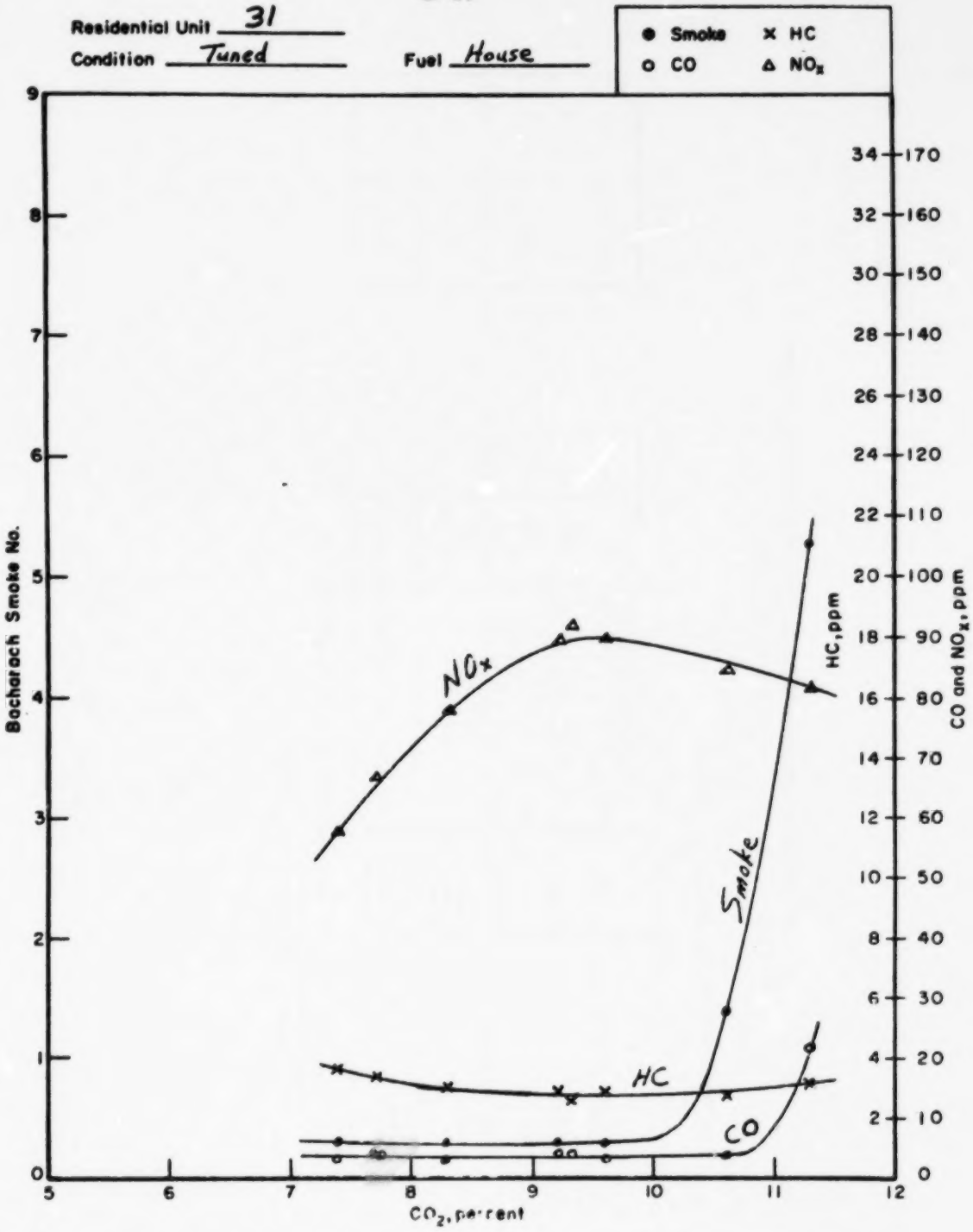


SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 31

Condition Tuned

Fuel House



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 32

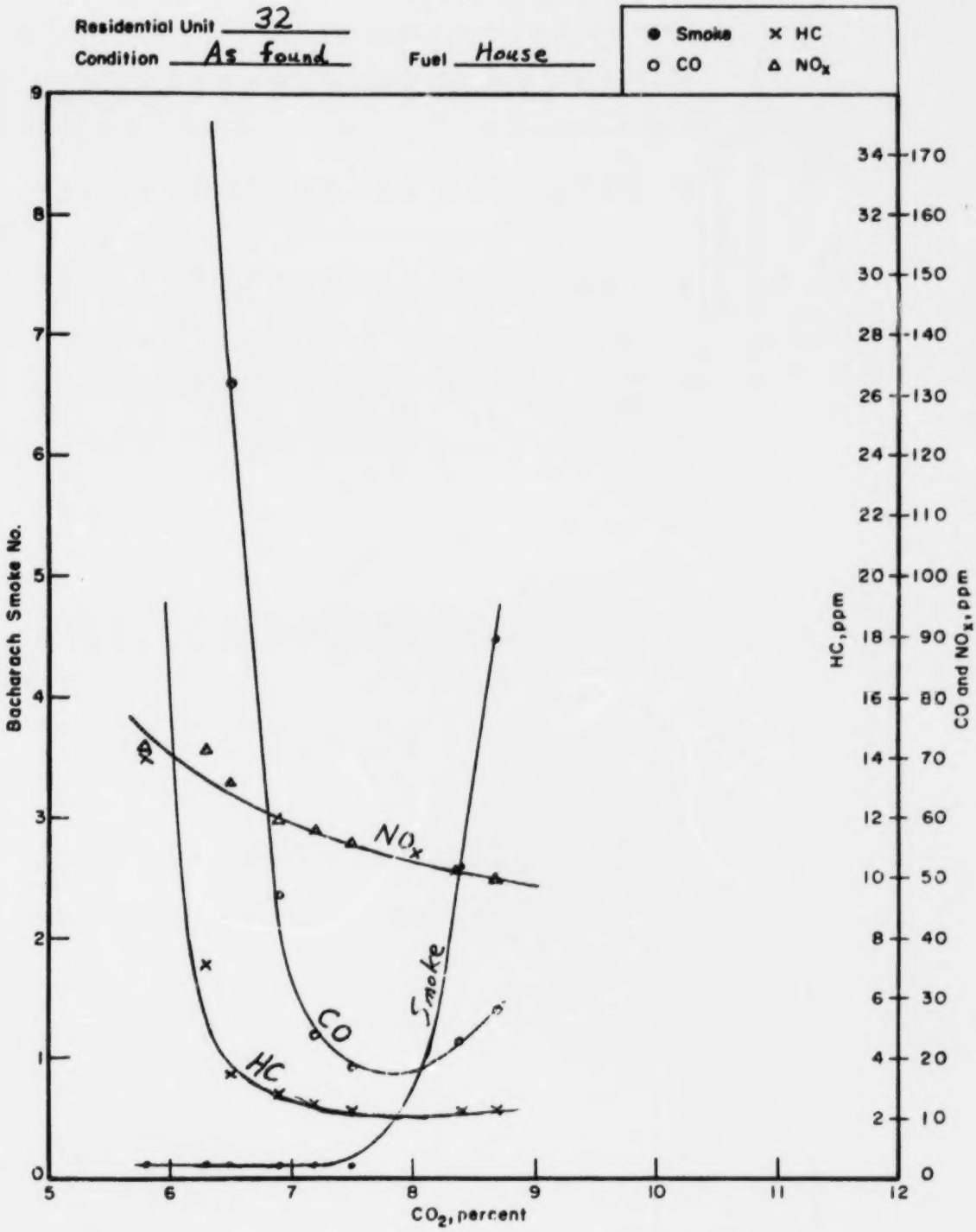
Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m³[c]	
		Smoke No.[a]	CO_2,%[b]	O_2,%[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	0.2 (0.1)	7.0	11.4	292.	12.5	31.	73.	5.3	42.9
Tuned	"	0.1 (0.1)	8.7	9.4	90.	2.8	63.	69.	10.5	37.3
"	Reference	0.1 (0.1)	8.6	9.3	44.	4.2	62	67.		
Second visit	House									
" "	Reference									
Third visit	House									
" "	Reference									

(a) At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).
(b) Average for "on" period of cycles.
(c) Based on sample collected during six 10-minute cycles.

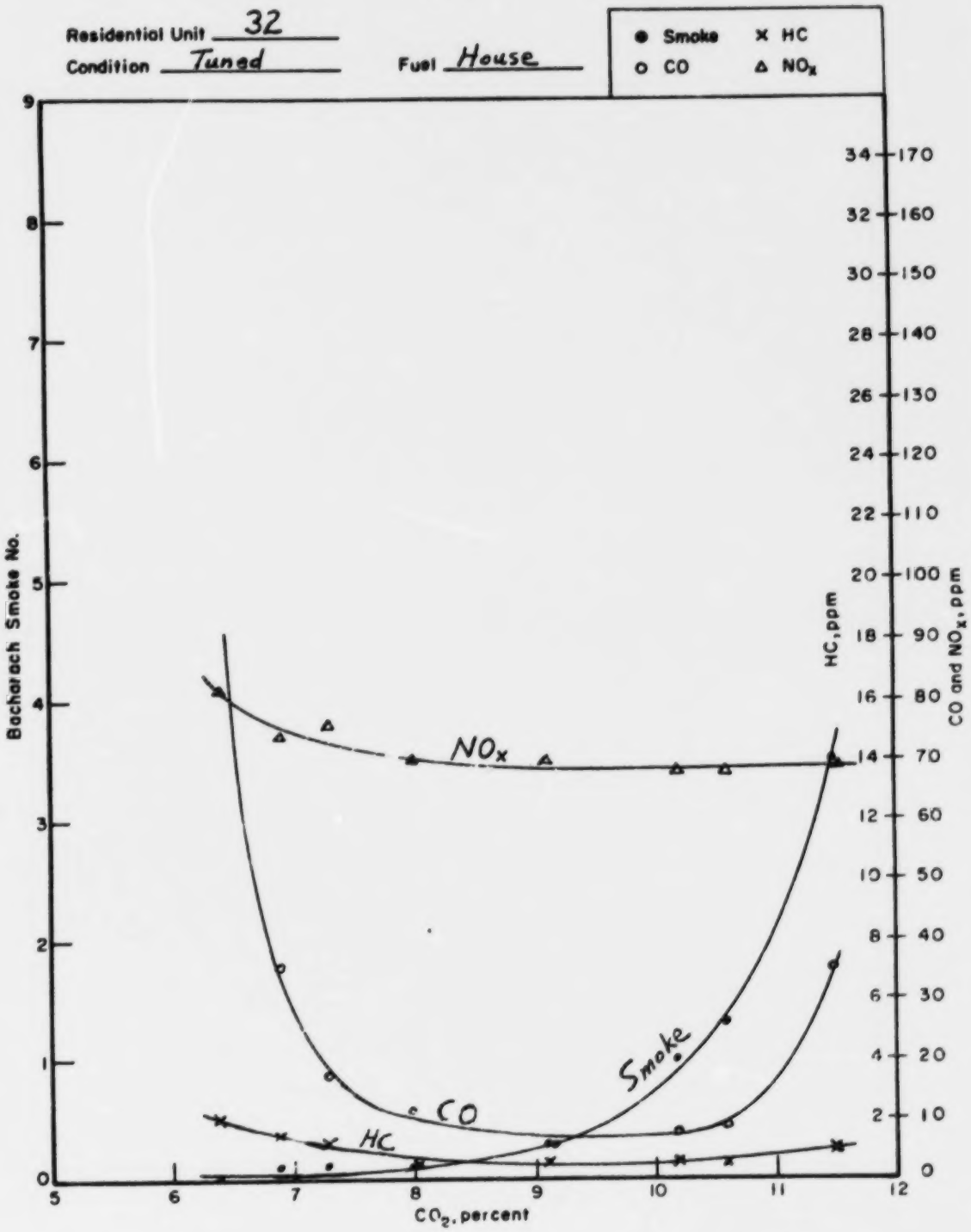
SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 32

Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke, No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	House	0.1	5.8	12.8		812.	14.0	28.	72.
		0.1	6.3	12.6		441.	7.0	29.	71.
		0.1	6.5	11.9		132.	3.4	37.	66.
		0.1	6.9	11.5		47.	2.8	45.	60.
		0.1	7.2	11.0		28.	2.5	49.	58.
		0.1	7.5	10.6		18.	2.3	50.	56.
		2.6	8.4	9.4		23.	2.3	48.	51.
		4.5	8.7	8.9		28.	2.3	47.	50.
Tuned	House	0.0	6.4	13.1		231.	2.0	18.	82.
		0.1	6.9	11.8		35.	1.4	55.	74.
		0.1	7.3	11.3		17.	1.2	62.	76.
		0.1	8.0	10.2		11.	0.5	61.	70.
		0.3	9.1	8.7		6.	0.5	64.	70.
		1.0	10.2	7.2		8.	0.5	61.	68.
		1.3	10.6	6.6		11.	0.5	62.	68.
		3.5	11.5	5.2		35.	0.9	65.	69.
Tuned	Reference	0.1	6.2	12.7	571	502.	9.0	33.	82.
		0.1	7.1	11.2	568	32.	1.7	60.	70.
		0.1	8.0	9.9	550	14.	1.3	65.	67.
		0.1	8.7	9.0	515	13.	1.1	61.	58.
		0.1	9.1	8.4	512	11.	—	65.	62.
		1.2	9.7	7.4	485	13.	1.0	57.	55.
		5.1	11.3	5.1	428	50.	1.4	61.	55.



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



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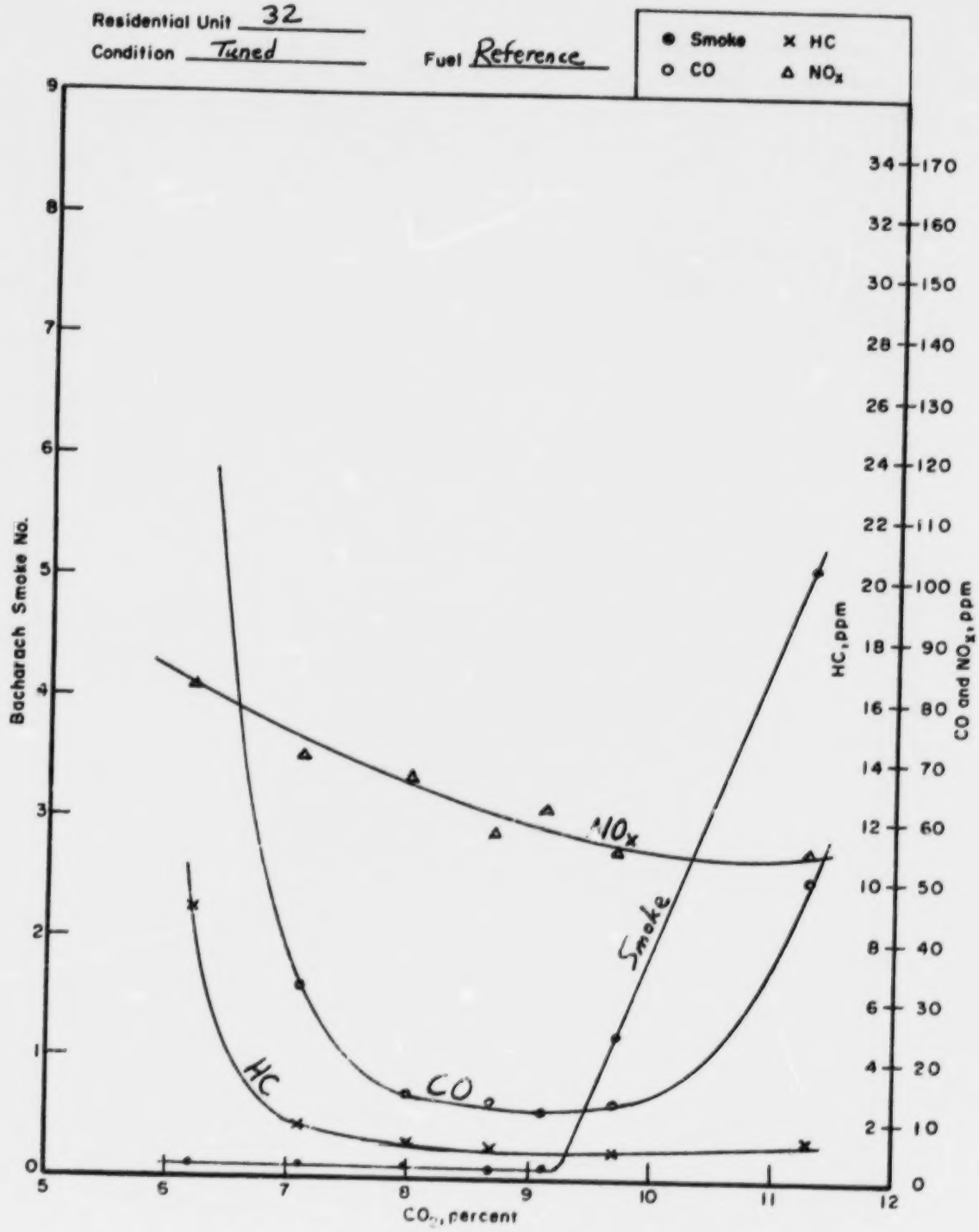


SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 33

Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m^3[c]	
		Smoke No.[a]	CO_2, %[b]	O_2, %[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	1.5 (2.0)[d]	6.1	12.6	>1240.	-	9.	87.	15.4	114.3
Tuned	"	1.8 (1.3)[d]	6.5	12.2	>1240.	211.	20.	105.	14.1	109.7
"	Reference	0.6 (0.6)[d]	6.6	12.1	>1240.	166.	22.	97.	-	-
Second visit	House									
" "	Reference									
Third visit	House									
" "	Reference									

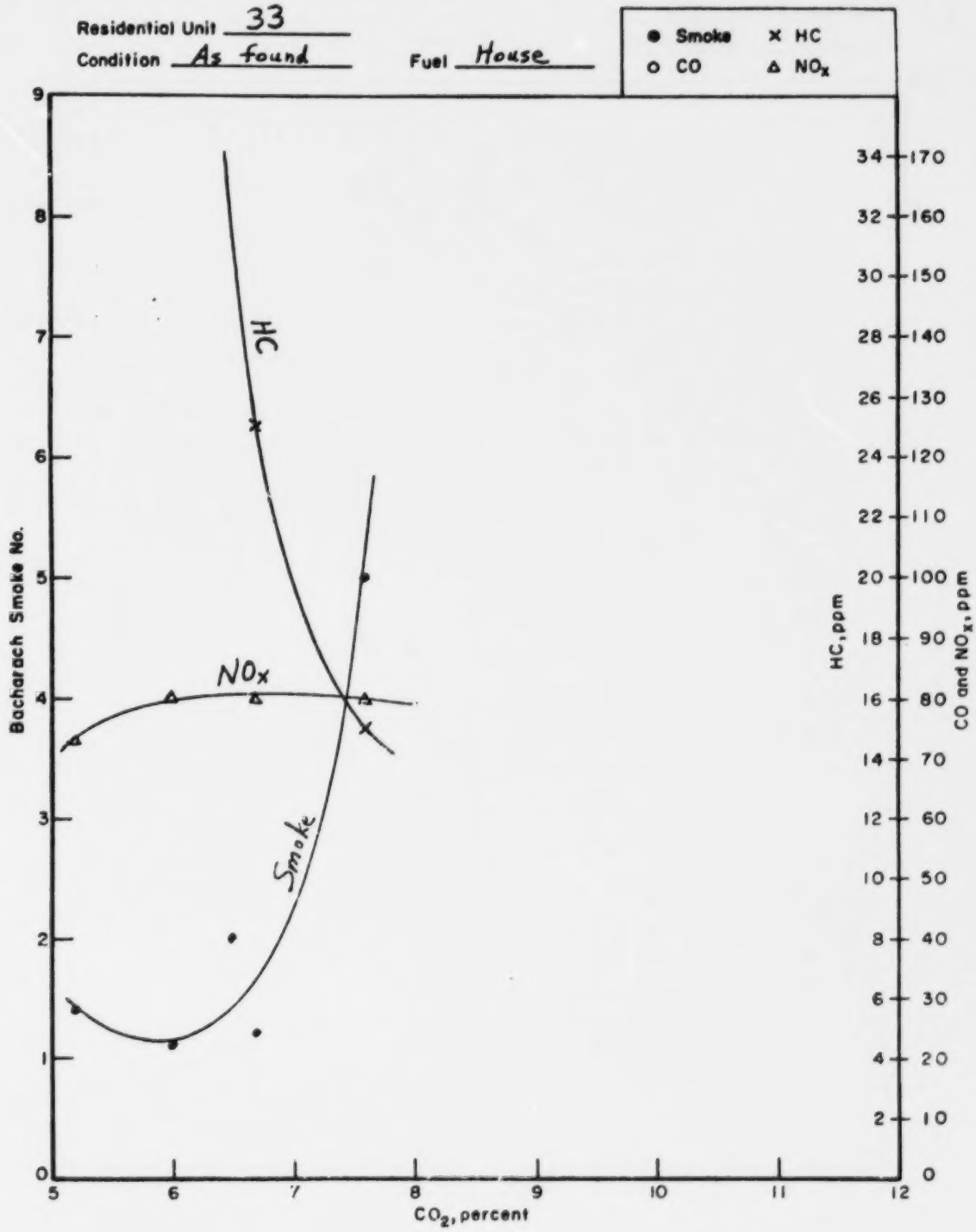
(a) At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).
(b) Average for "on" period of cycles.
(c) Based on sample collected during six 10-minute cycles.
(d) Smoke spots and water trap showed signs of unburned fuel.

SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

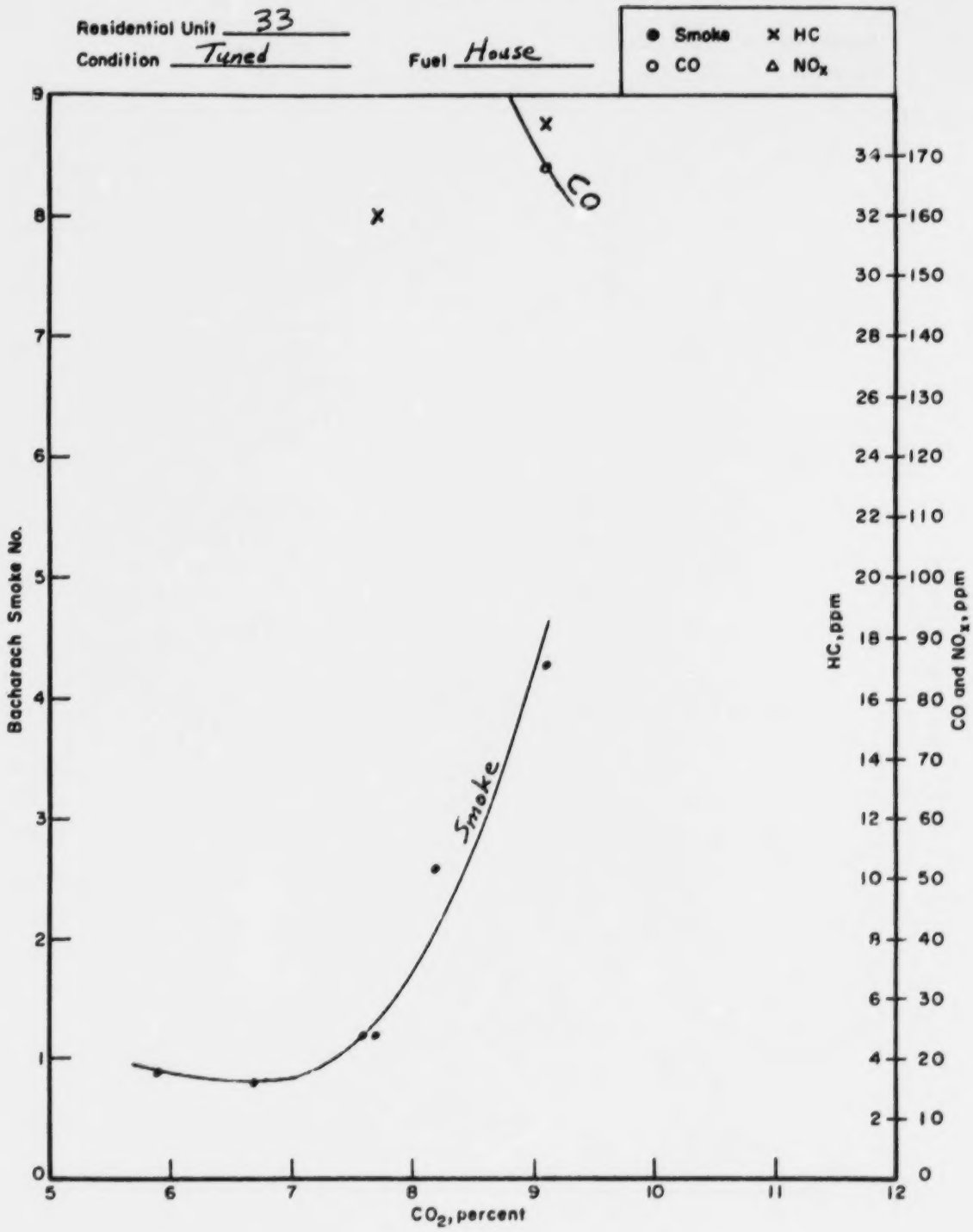
Residential Unit 33

Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	House	3.0 (a)	3.8	15.1		>1240.	3800.	25.	–
		1.4 (a)	5.2	13.3		>1240.	450.	12.	73.
		1.1 (a)	6.0	12.5		>1240.	62.	14.	80.
		2.0 (a)	6.5	11.6		>1240.	200.	18.	–
		1.2 (a)	6.7	11.7		>1240.	25.	22.	80.
		5.0 (a)	7.6	10.3		640.	15.	30.	80.
Tuned	House	1.3 (a)	4.8	14.4	605	>1240.	1450.	14.	>100. (b)
		0.9 (a)	5.9	13.2	620	>1240.	420.	10.	>160. (b)
		0.8 (a)	6.7	12.2	630	>1240.	150.	10.	≈190. (b)
		–	6.8	11.5	632	990.	37.	28.	<148. (b)
		1.2 (a)	7.6	11.1	618	760.	65.	21.	≈186. (b)
		1.2 (a)	7.7	11.2	628	580.	32.	30.	<155. (b)
		2.6 (a)	8.2	10.4	609	360.	43.	33.	<170. (b)
		4.3 (a)	9.1	9.0	589	168.	35.	48.	<162. (b)
Tuned	Reference	1.1 (a)	4.7	14.4	570	>1240.	1700.	16.	>64. (b)
		0.8 (a)	5.9	13.0	620	>1240.	260.	13.	>150. (b)
		0.7 (a)	6.7	11.9	619	>1240.	90.	25.	≈154. (b)
		0.4 (a)	6.9	11.2		650.	29.	34.	≈118. (b)
		2.5 (a)	8.1	10.0	600	280.	33.	45.	<140. (b)
		3.6 (a)	9.3	8.1	568	118.	28.	59.	<128. (b)

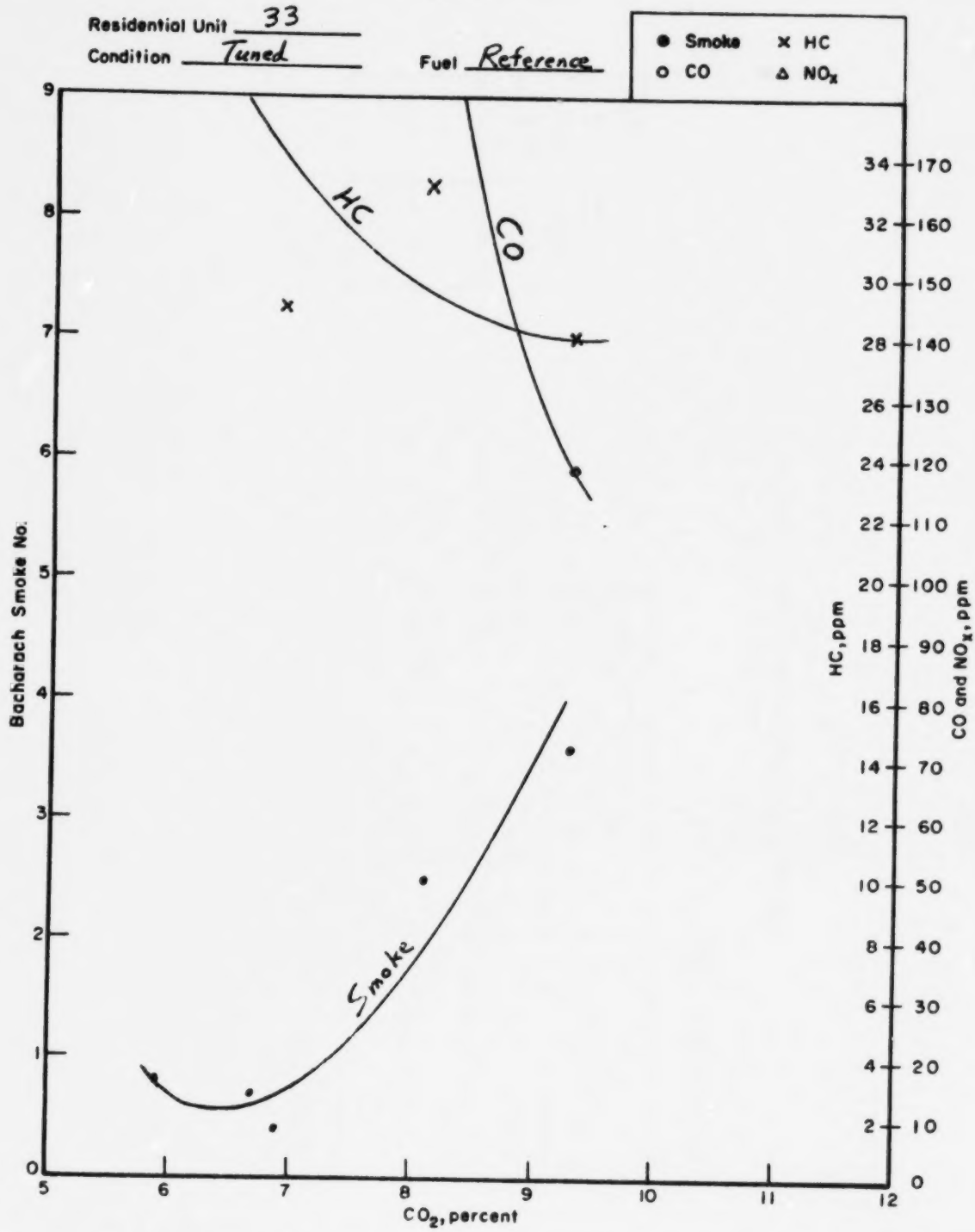
(a) Smoke spots and water trap showed signs of unburned fuel.
(b) NO_x response was abnormally sluggish and steady-state values were not obtained.



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 34

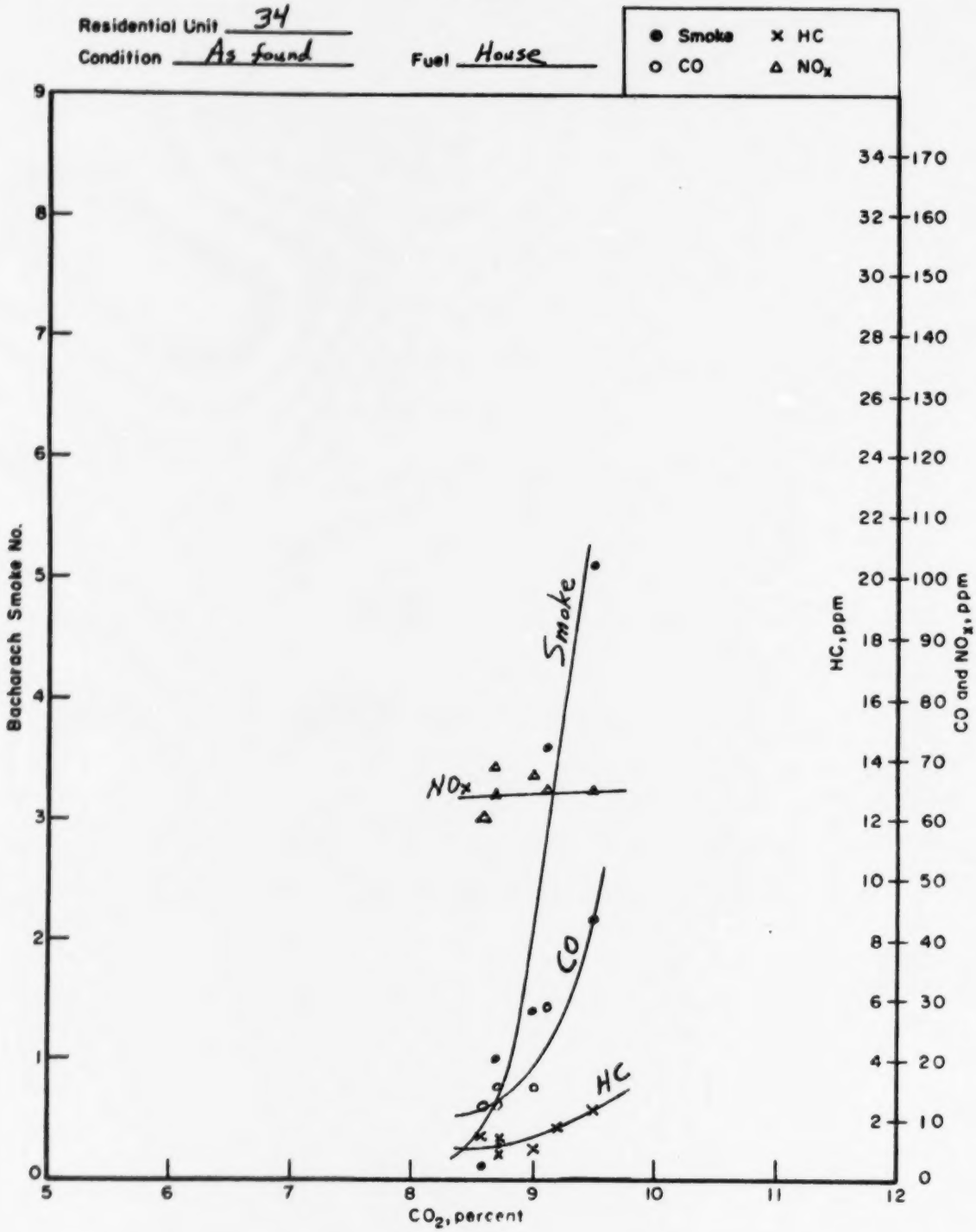
Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m^3[c]	
		Smoke No.[a]	CO_2,%[b]	O_2,%[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	2.7 (2.6)	9.4	7.4	19.6	5.4	62.	62.	18.9	46.8
Tuned	"	1.0 (1.5)	9.8	8.0	14.8	3.9	58.	56.	10.9	38.9
"	Reference	1.9 (1.6)	10.1	7.3	18.2	5.1	63.	62.	—	—
Second visit	House									
" "	Reference									
Third visit	House									
" "	Reference									

(a) *At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).*
(b) *Average for "on" period of cycles.*
(c) *Based on sample collected during six 10-minute cycles.*

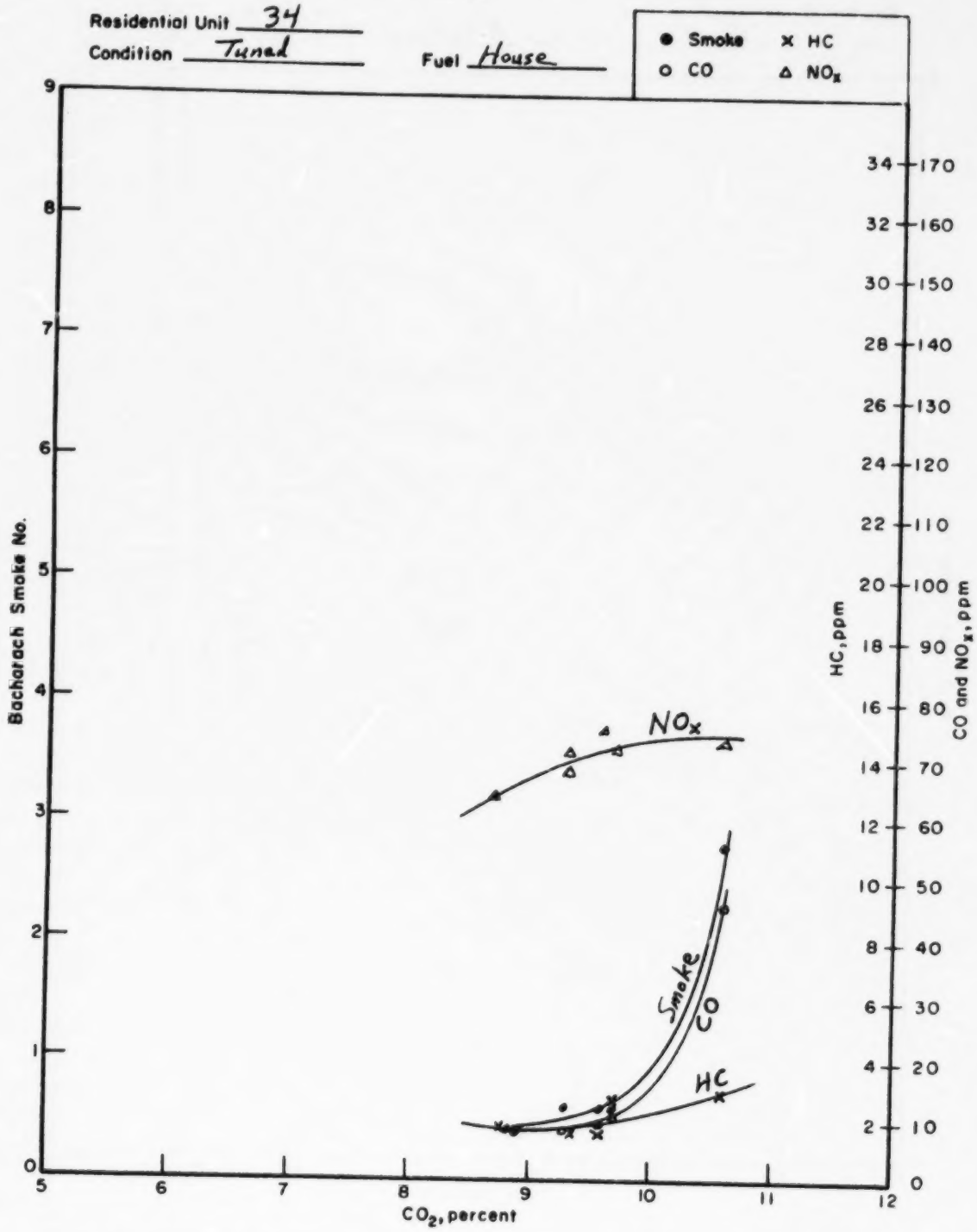
SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 34

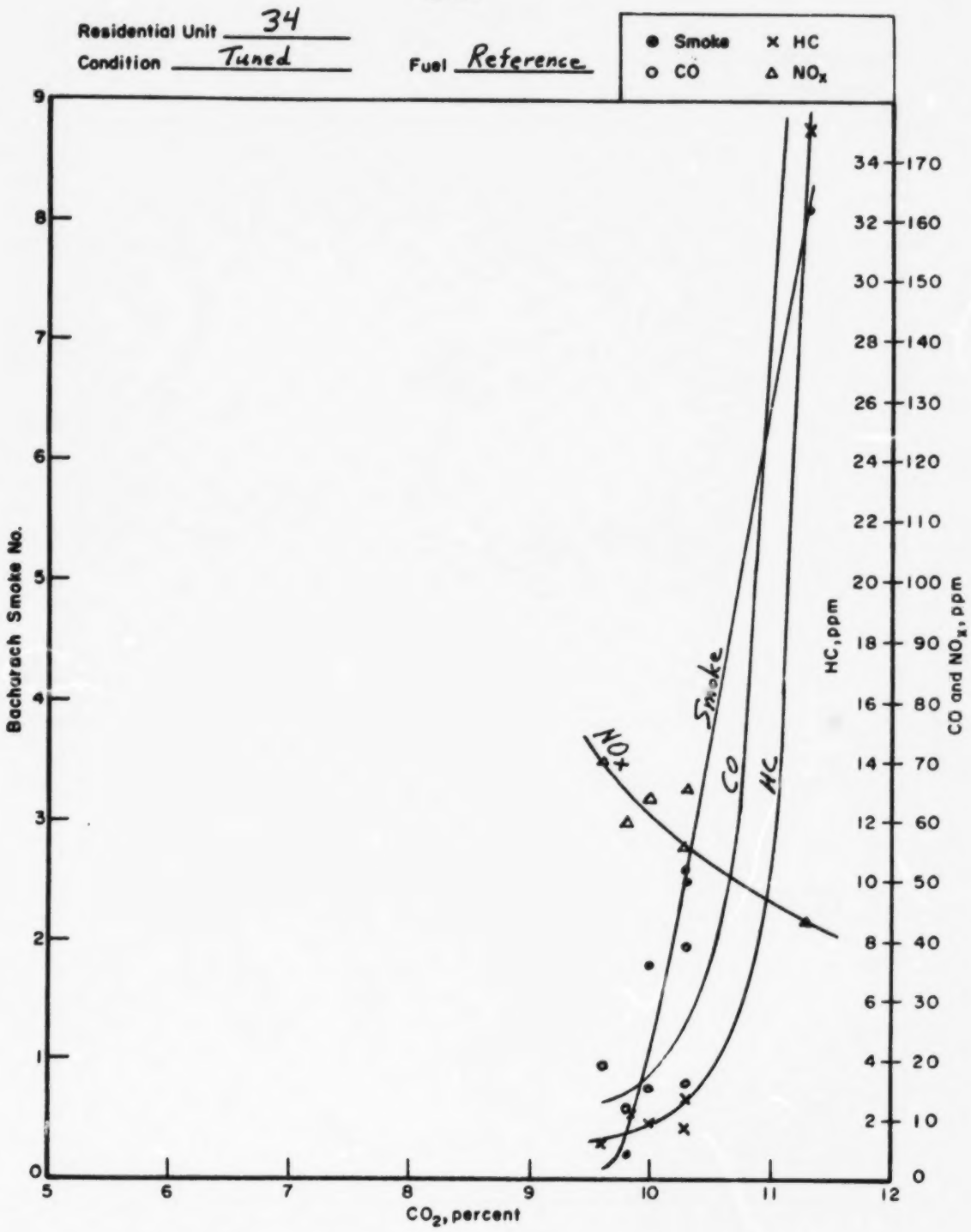
Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke.No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	House	0.1	8.6	8.4	450	12.	1.4	56.	60.
		0.3	8.7	8.0	480	12.	1.3	61.	64.
		1.0	8.7	7.6	480	15.	0.8	68.	69.
		1.4	9.0	7.4	480	15.	1.0	64.	67.
		3.6	9.1	7.2	480	29.	1.7	62.	65.
		5.1	9.5	6.6	470	43.	2.3	62.	65.
Tuned	House	0.4	8.9	8.5	505	9.	1.7	58.	64.
		0.6	9.3	8.2	509	9.	1.6	63.	68.
		0.6	9.3	8.0	508	9.	1.6	66.	71.
		0.6	9.6	7.8	501	10.	1.6	70.	75.
		0.6	9.7	7.6	501	11.	2.7	68.	72.
		2.8	10.6	6.7	480	46.	2.9	68.	73.
Tuned	Reference	—	9.6	7.8	500	19.	1.2	72.	70.
		0.2	9.8	7.5	480	12.	2.2	61.	60.
		1.8	10.0	7.2	500	15.	1.9	63.	64.
		2.6	10.3	7.2	495	39.	2.7	56.	56.
		2.5	10.3	7.1	500	16.	1.7	66.	66.
		8.1	11.3	5.6	495	1125.	35.	44.	43.



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR RESIDENTIAL UNITS FOR CYCLIC RUNS

Residential Unit 35

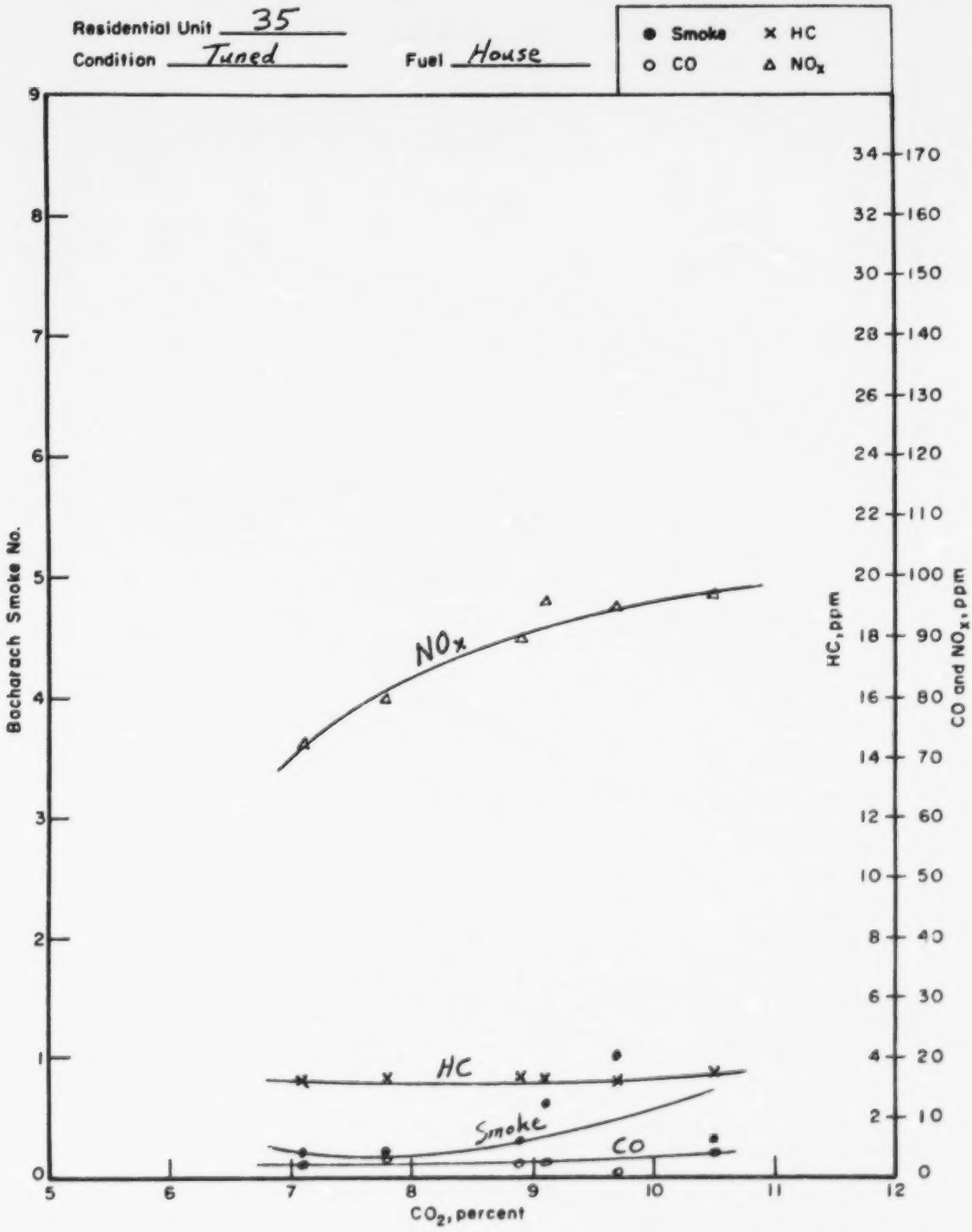
Unit Condition	Fuel	Combustion Conditions			Gaseous Emissions, ppm[b]				Particulate Loading, mg/m^3[c]	
		Smoke No.[a]	CO_2, %[b]	O_2, %[b]	CO	HC	NO	NO_x	Probe + Filter	Total
As found	House	—	—	—	—	—	—	—	—	—
Tuned	"	0.2 (0.2)	8.8	8.7	2.5	5.5	77.	85.	4.2	55.2
"	Reference	0.2 (0.2)	9.3	7.5	3.8	9.6	84.	91.	2.9	37.6
Second visit	House									
" "	Reference									
Third visit	House									
" "	Reference									

(a) At 9-minute point of 4th cycle (5th minute smoke no. shown in parentheses).
(b) Average for "on" period of cycles.
(c) Based on sample collected during six 10-minute cycles.

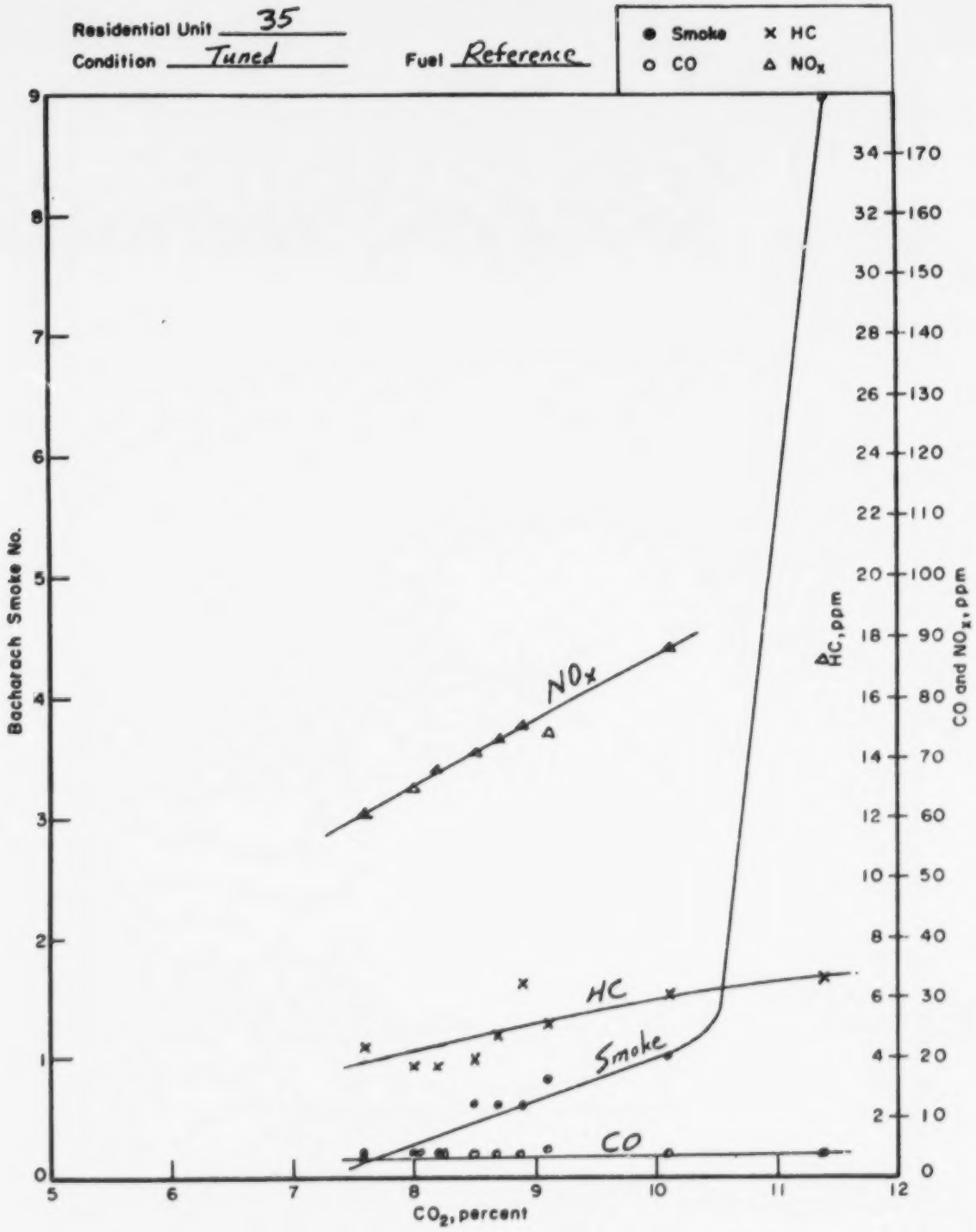
SMOKE AND GASEOUS EMISSIONS DATA FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

Residential Unit 35

Unit Condition	Fuel	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm			
		Smoke.No.	CO_2, %	O_2, %		CO	HC	NO	NO_x
As found	House								
Tuned	House	0.2	7.1	11.3	500	2.	3.3	62.	72.
		0.2	7.8	10.1	500	3.	3.3	72.	80.
		0.3	8.9	8.7	475	2.	3.3	82.	90.
		0.6	9.1	8.2	468	2.	3.2	83.	96.
		1.0	9.7	7.4	450	1.	3.1	85.	95.
		0.3	10.5	6.2	430	4.	3.4	88.	97.
Tuned	Reference	0.2	7.6	10.2	515	3.	4.5	69.	61.
		0.2	8.0	9.5	522	4.	3.7	76.	65.
		0.2	8.2	9.1	518	4.	3.7	79.	68.
		0.5	8.5	8.7	510	4.	4.0	82.	71.
		0.5	8.7	8.3	500	4.	4.8	85.	73.
		0.5	8.9	7.8	495	5.	6.5	89.	75.
		0.8	9.1	7.6	488	4.	5.2	88.	74.
		1.0	10.1	6.4	462	4.	6.1	88.	88.
		9.0	11.4	4.5	405	22.	6.7	89.	86.



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR RESIDENTIAL UNITS AS FUNCTION OF CO_2

APPENDIX H

DATA FOR COMMERCIAL BOILERS

SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2001 Fuel No. 2

Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/sm^3	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
99.	11.5	—	0.2	11.6	4.3	730	6.	0.4	58.	58.	134.	—	—
			0.4	12.1	3.8	720	5.	0.7	58.	58.	138.	—	—
			3.8	13.0	2.7	710	31.	0.9	56.	57.	150.	—	—
			7.4	13.5	1.8	700	560.	80.	57.	57.	166.	—	—
80.	9.3	—	1.5	9.3	8.4	680	132.	19.5	50.	51.	104.	—	—
			1.4	9.9	7.4	670	78.	9.3	54.	53.	112.	—	—
			1.4	10.9	6.2	655	41.	4.5	59.	59.	122.	—	—
			2.4	12.1	4.4	618	14.	1.5	61.	62.	142.	4.6	45.4
			2.4	12.2	4.3	650	13.	1.5	60.	61.	138.	—	—
			7.8	13.4	2.8	620	22.	1.2	61.	60.	156.	—	—
60.	7.0	—	0.6	9.3	7.4	565	244.	40.	37.	42.	100.	—	—
			0.4	9.9	6.6	553	79.	9.0	41.	46.	112.	—	—
			0.4	10.9	5.2	542	13.	2.0	46.	48.	124.	—	—
			1.2	11.4	4.5	—	7.	1.5	49.	48.	129.	—	—
			3.2	12.0	3.9	530	5.	1.7	47.	51.	136.	—	—
			2.8	12.0	3.5	530	5.	1.7	47.	50.	132.	9.2	22.7
			8.4	13.0	2.3	512	49.	4.2	45.	46.	149.	—	—

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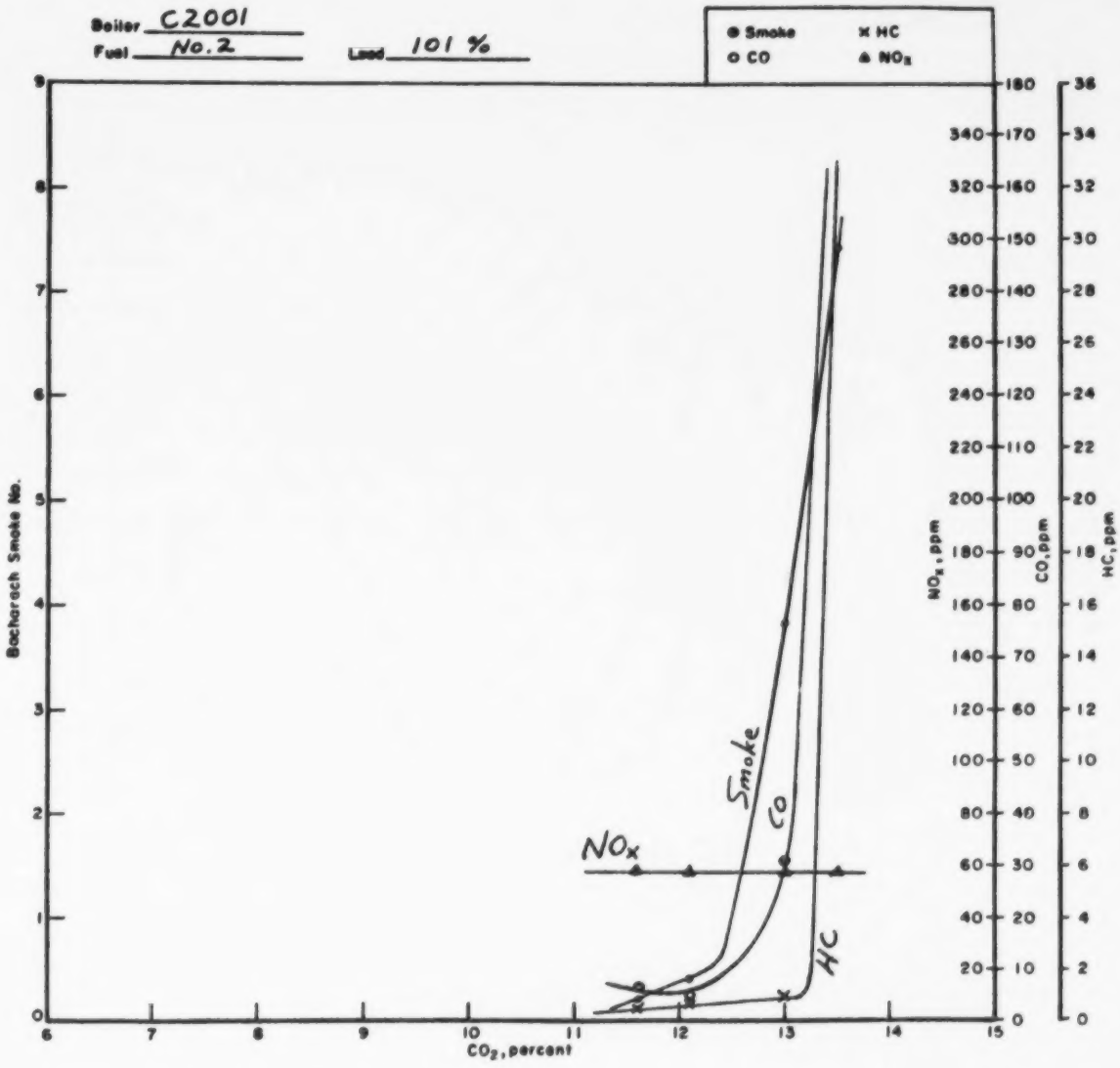
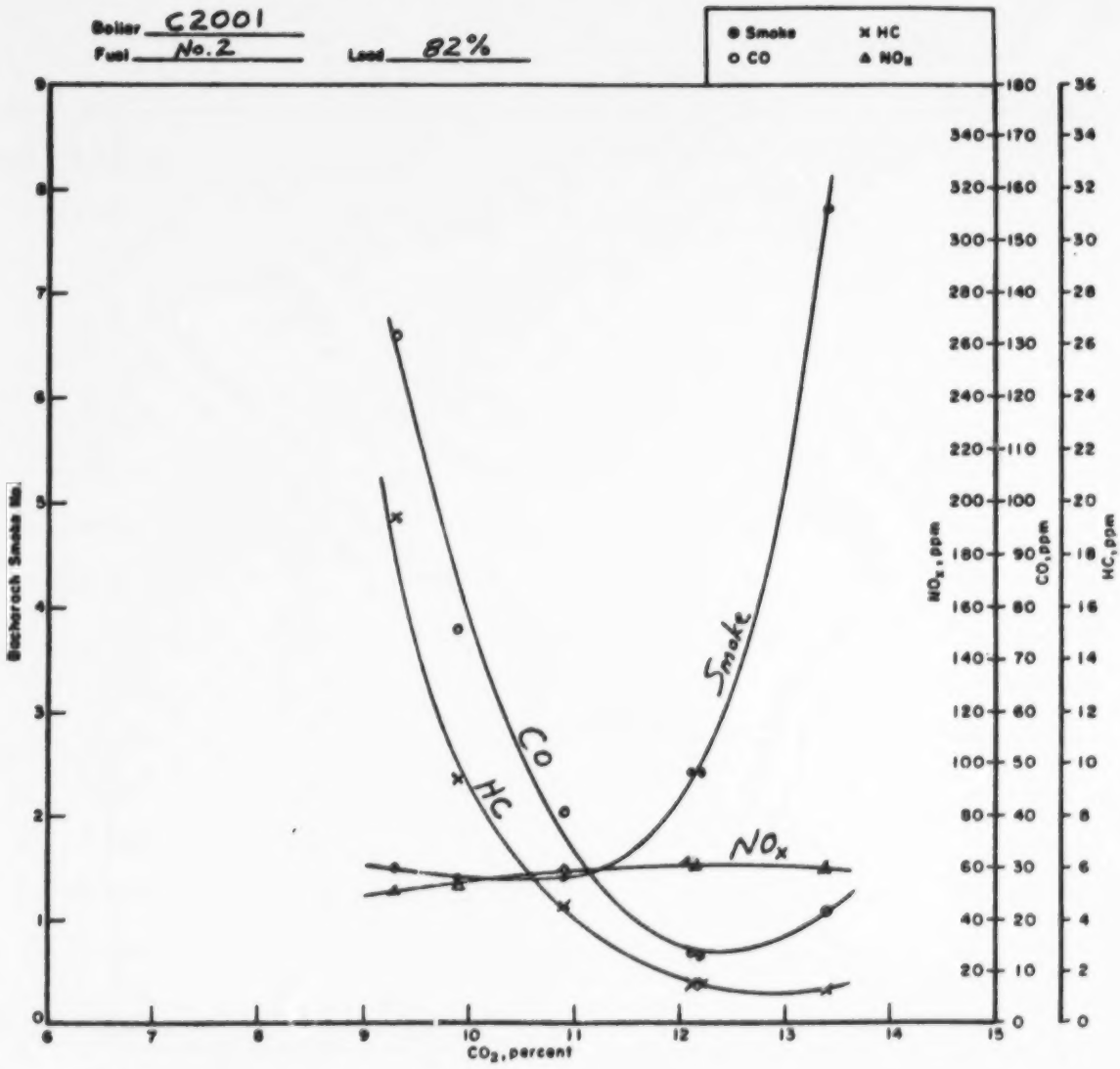
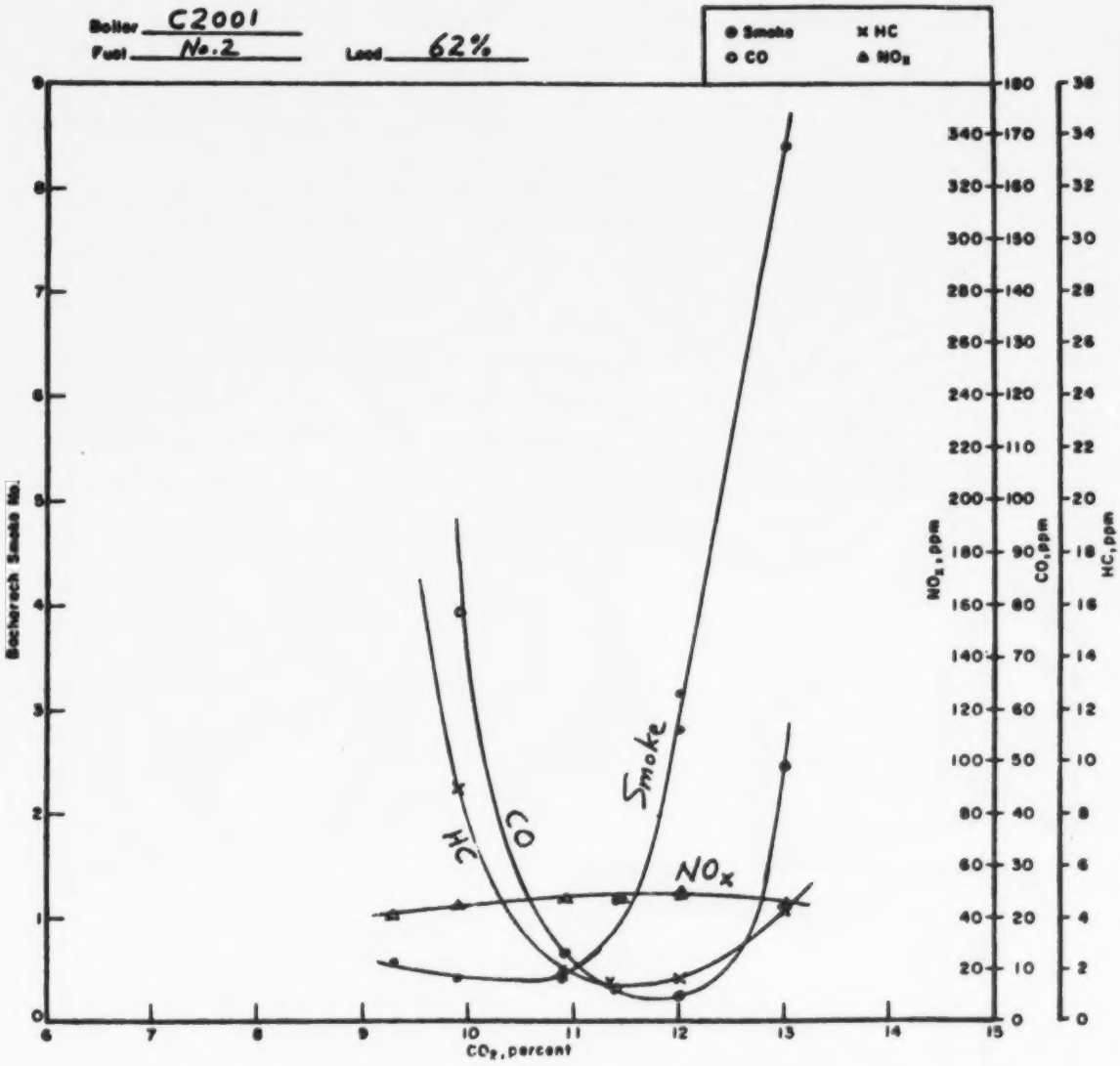


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

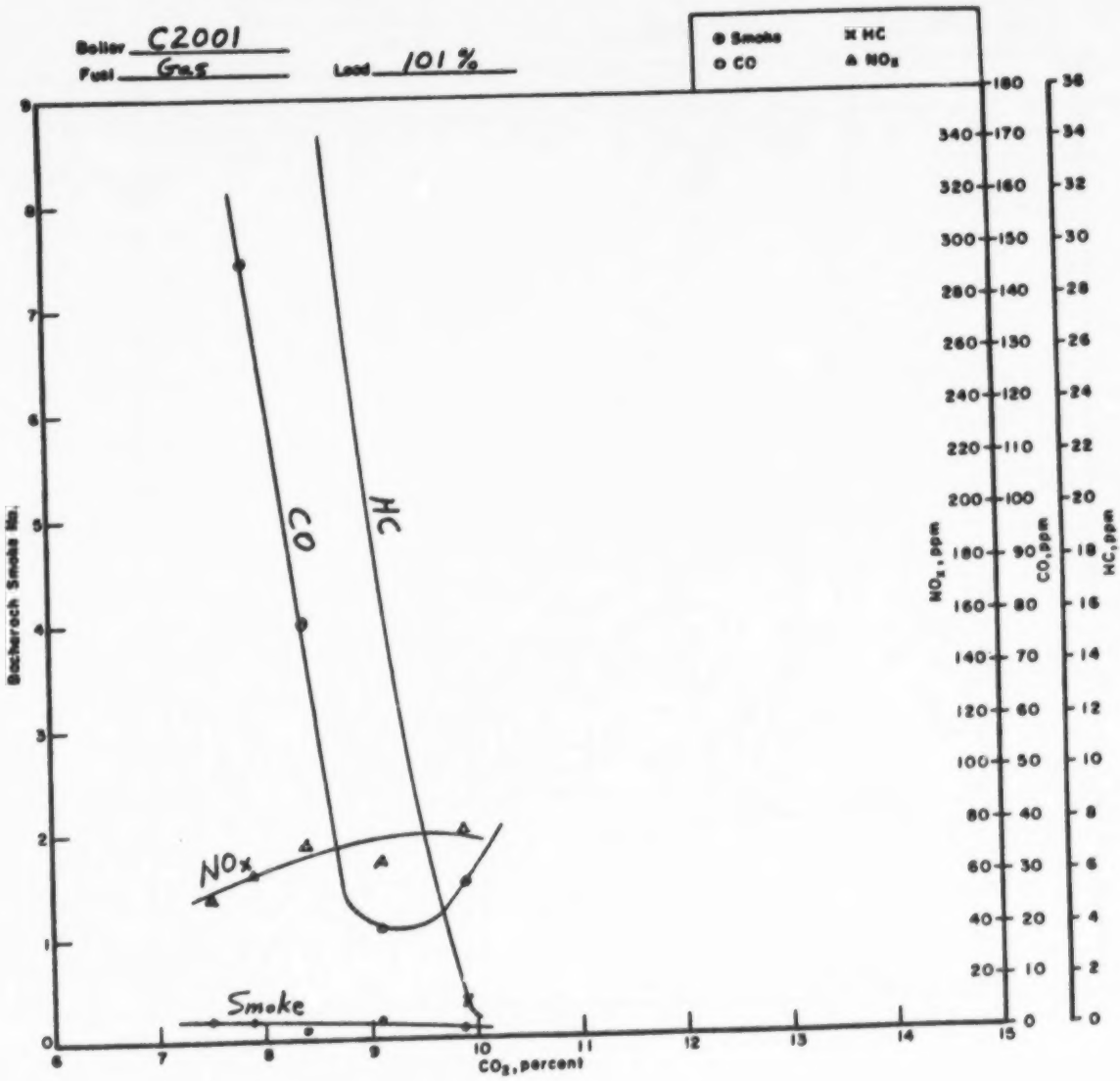


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

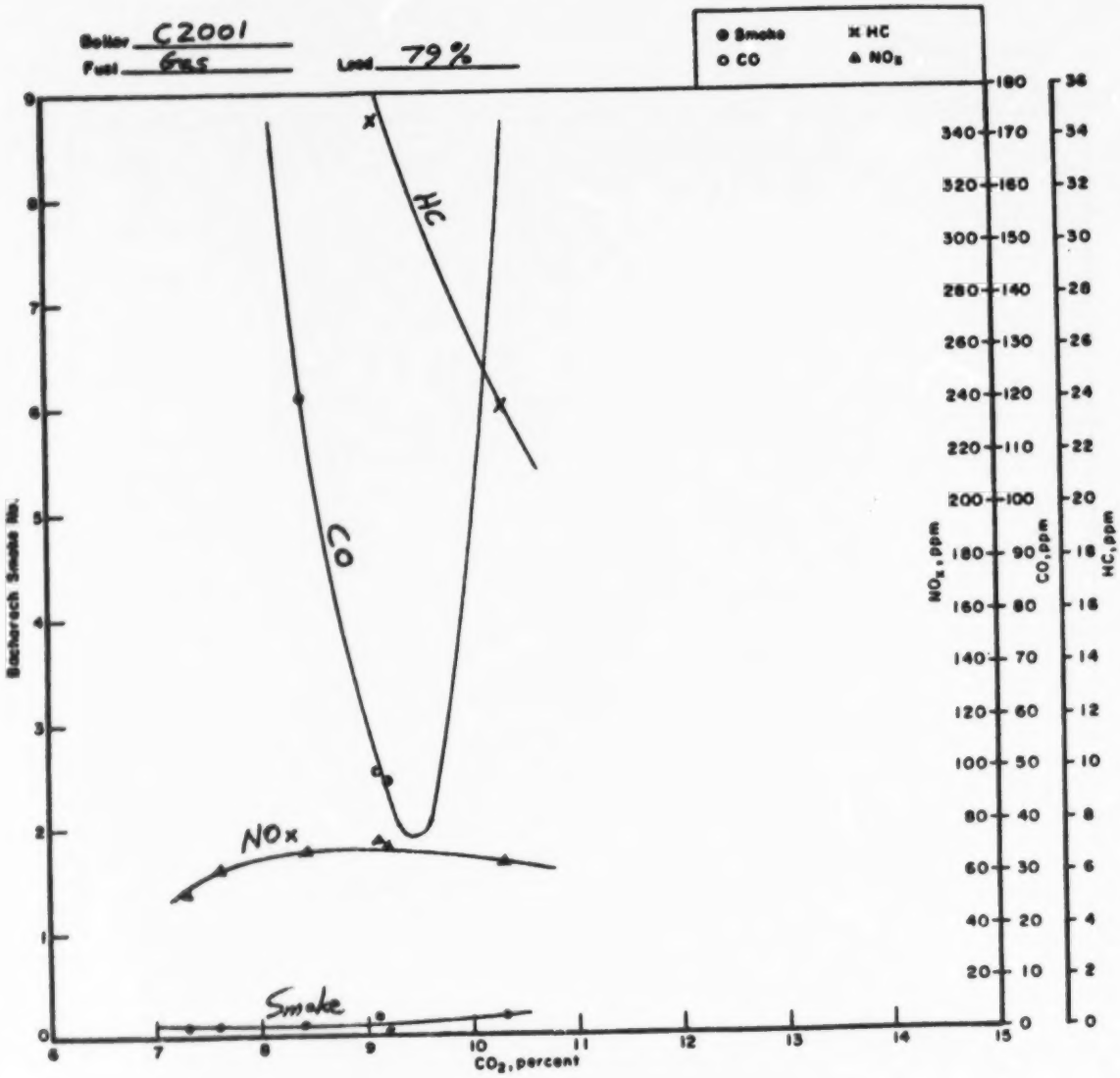
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C 2001 Fuel Gas

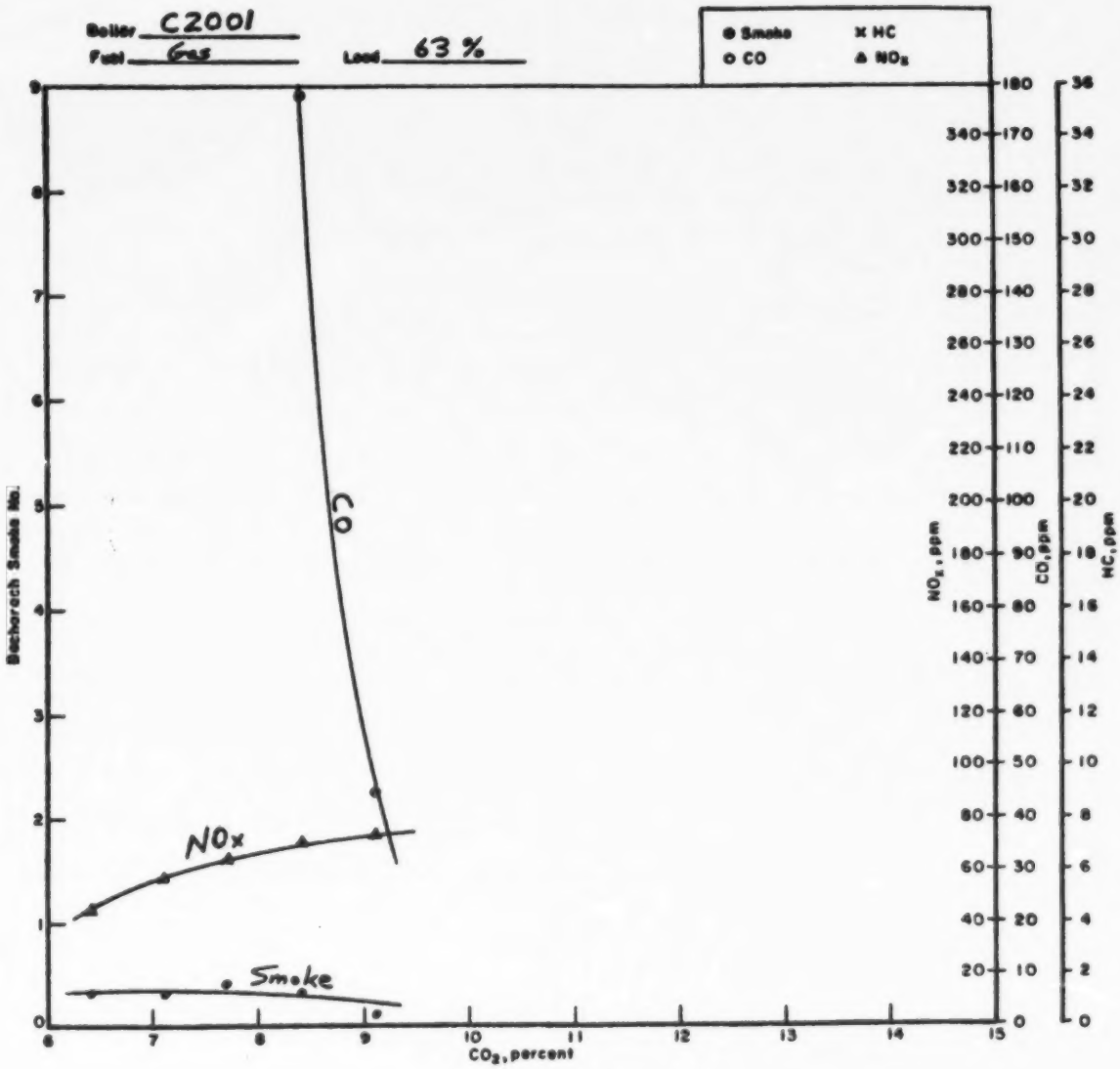
Load, percent	Firing Rate, cfh	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/sm^3	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
102.	1600.	—	0.2	7.5	7.7	758	270.	110.	48.	55.	0	—	—
			0.2	7.9	6.8	750	149.	55.	60.	63.	0	—	—
			0.1	8.5	6.2	745	80.	50.	74.	75.	0	—	—
			0.2	9.1	5.0	729	22.	45.	69.	69.	0	—	—
			0.1	9.9	3.4	739	30.	1.5	78.	81.	0	—	—
81.	1260.	—	0.1	7.3	8.1	712	330.	255	50.	56.	0	—	—
			0.1	7.6	7.3	709	260.	165.	58.	64.	0	—	—
			0.1	8.4	6.2	700	123.	55.	69.	71.	0	—	—
			0.2	9.1	5.0	700	51.	35.	71.	75.	0	2.6	14.2
			0.0	9.2	4.5	700	48.	37.	72.	72.	0	—	—
			0.2	10.3	3.0	680	356.	24.	62.	67.	0	—	—
65.	1010.	—	0.3	6.4	9.5	625	351.	470.	36.	45.	0	—	—
			0.3	7.1	8.2	625	290.	305.	50.	58.	0	—	—
			0.4	7.7	7.0	610	232.	180.	60.	65.	0	—	—
			0.3	8.4	6.0	598	178.	130.	65.	71.	0	—	—
			0.1	9.1	4.3	585	45.	68.	71.	73.	0	—	—



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

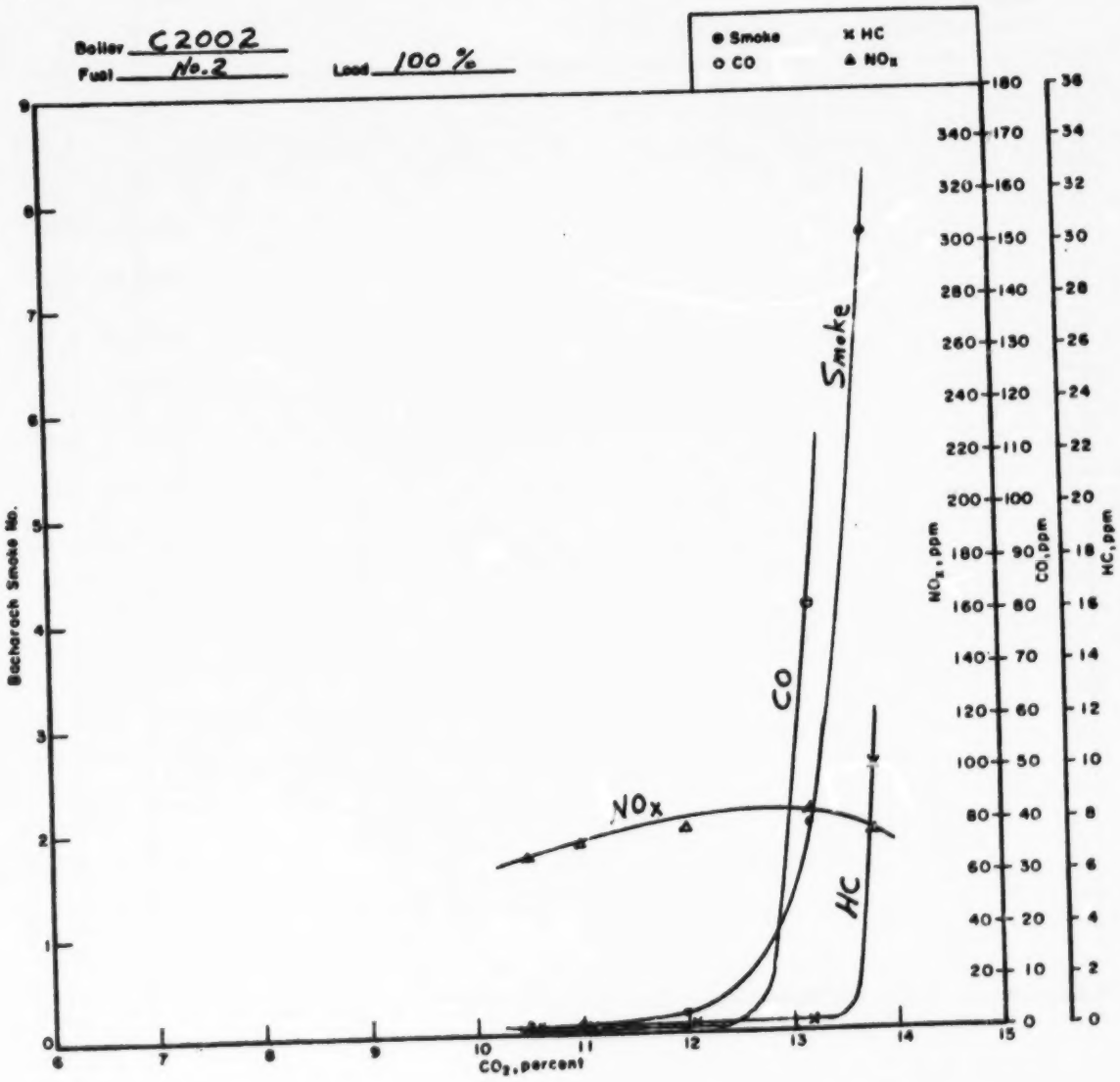


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

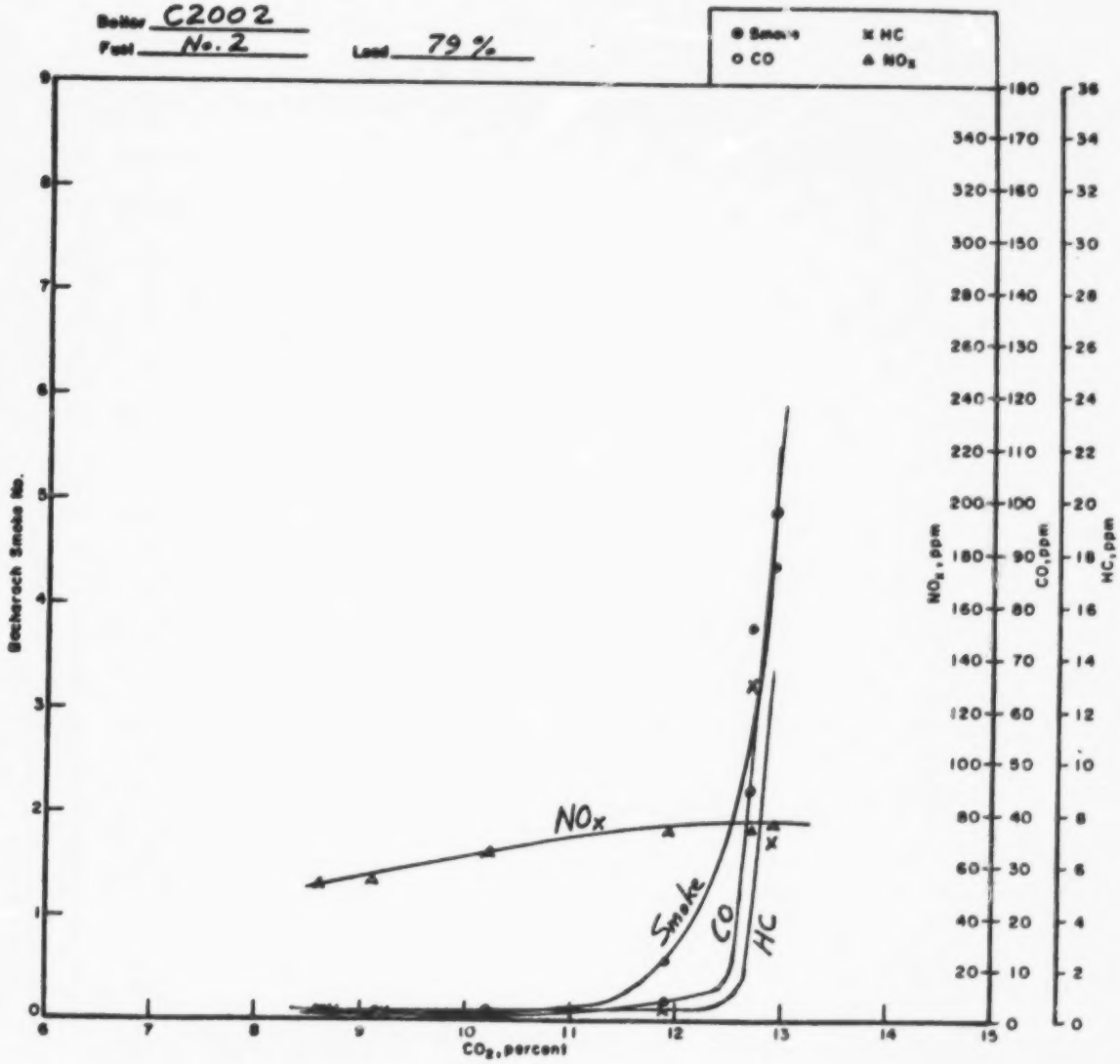
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2002 Fuel No. 2

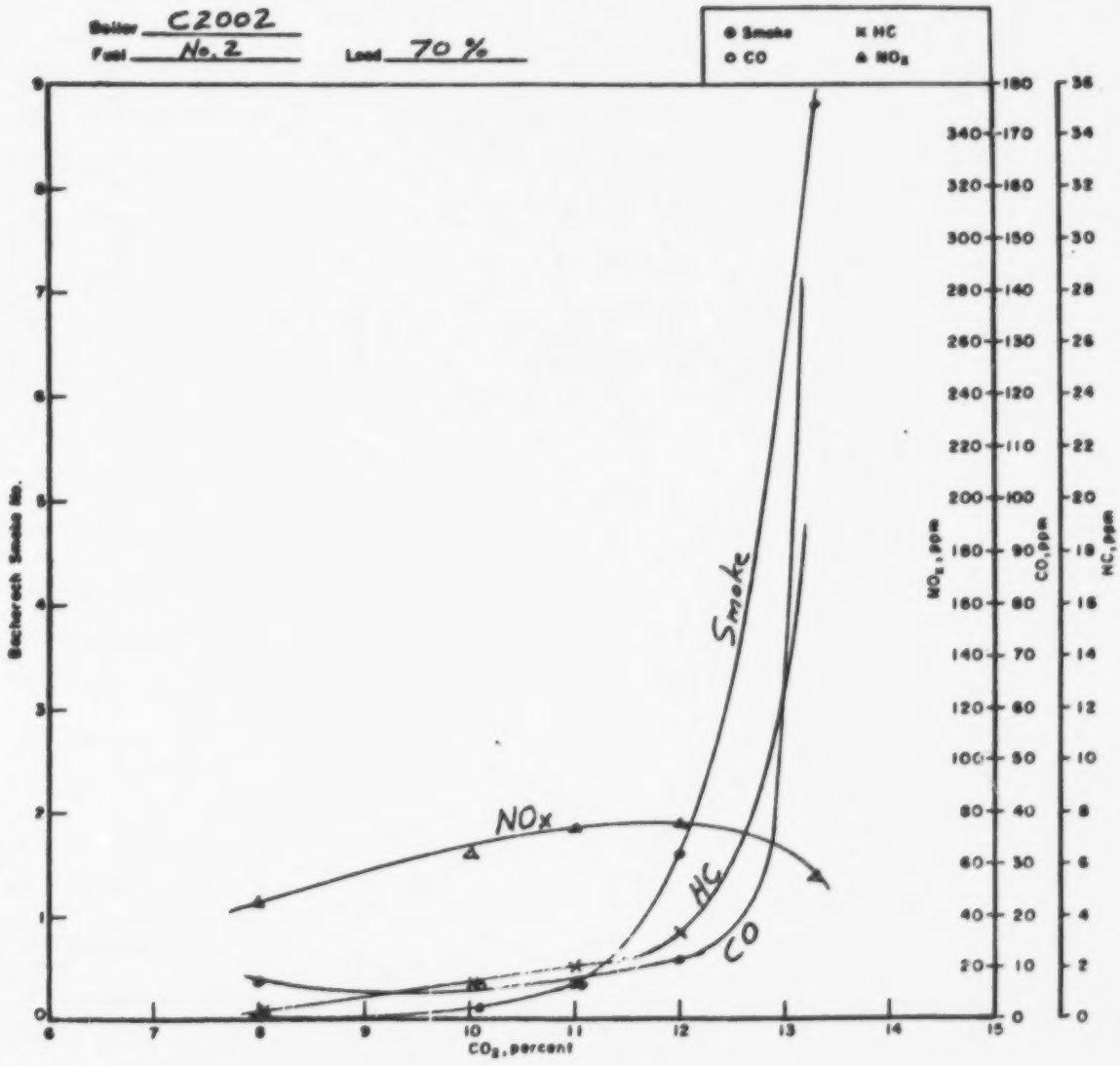
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/sm^3	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
99.	27.2	—	0.1	10.5	6.6	662	0	<1.0	67.	69.	120.	—	—
			0.1	11.0	6.0	680	0	<1.0	73.	73.	128.	—	—
			0.2	12.0	4.6	665	0	<1.0	77.	79.	140.	—	—
			2.0	13.2	2.8	635	82.	<1.0	85.	85.	164.	—	—
			7.7	13.8	1.8	615	>1230.	10.1	82.	78.	196.	—	—
78.	21.6	—	0.1	8.6	9.3	626	2.	<1.0	50.	52.	100.	—	—
			0.0	9.1	8.8	618	2.	<1.0	55.	55.	106.	—	—
			0.1	10.2	7.3	592	1.	<1.0	65.	66.	120.	—	—
			0.6	11.9	5.3	560	4.	0.5	75.	74.	140.	9.6	20.0
			3.8	12.7	4.2	540	45.	13.0	73.	74.	150.	—	—
			4.4	12.9	4.0	540	98.	7.0	76.	76.	156.	—	—
71.	19.2	—	0.0	8.0	10.6	600	7.	<1.0	47.	46.	92.	—	—
			0.1	10.1	7.4	555	6.	1.2	64.	65.	120.	—	—
			0.3	11.0	6.1	540	6.	2.0	73.	74.	132.	—	—
			1.6	12.0	4.7	532	11.	3.2	75.	76.	144.	—	—
			8.8	13.3	2.8	460	>1230.	100.	61.	55.	196.	—	—
59.	16.3	—	0.3	7.6	10.7	560	1.	<0.5	44.	45.	80.	—	—
			0.2	8.3	10.0	545	0	<0.5	50.	50.	91.	—	—
			0.7	9.4	8.6	525	0	<0.5	58.	58.	106.	—	—
			0.5	11.0	6.3	498	0	0.8	70.	70.	124.	—	—
			1.2	12.1	9.8	485	0	1.5	74.	75.	137.	—	—
			6.3	12.7	3.8	465	12.	1.1	61.	62.	145.	—	—



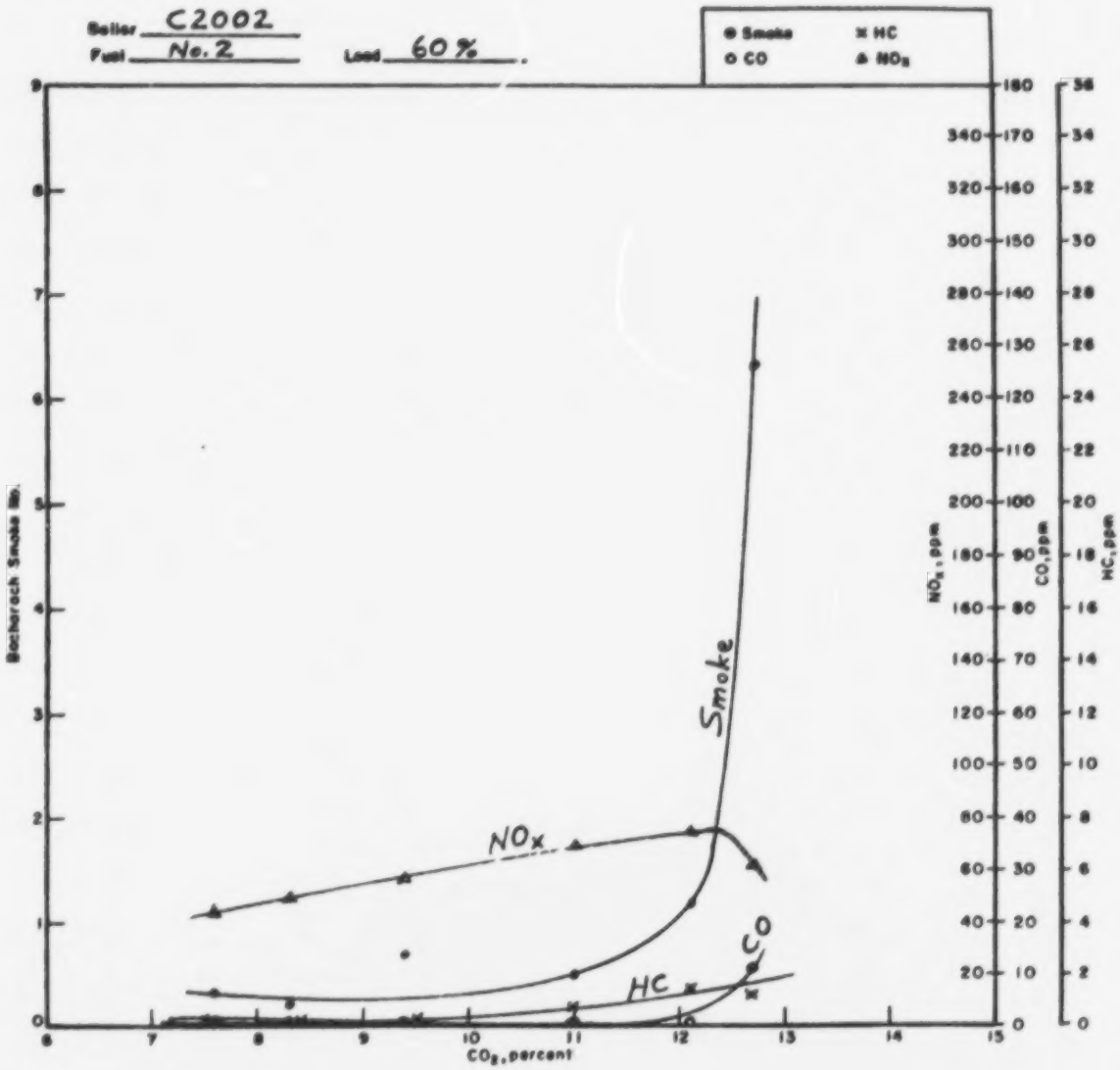
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



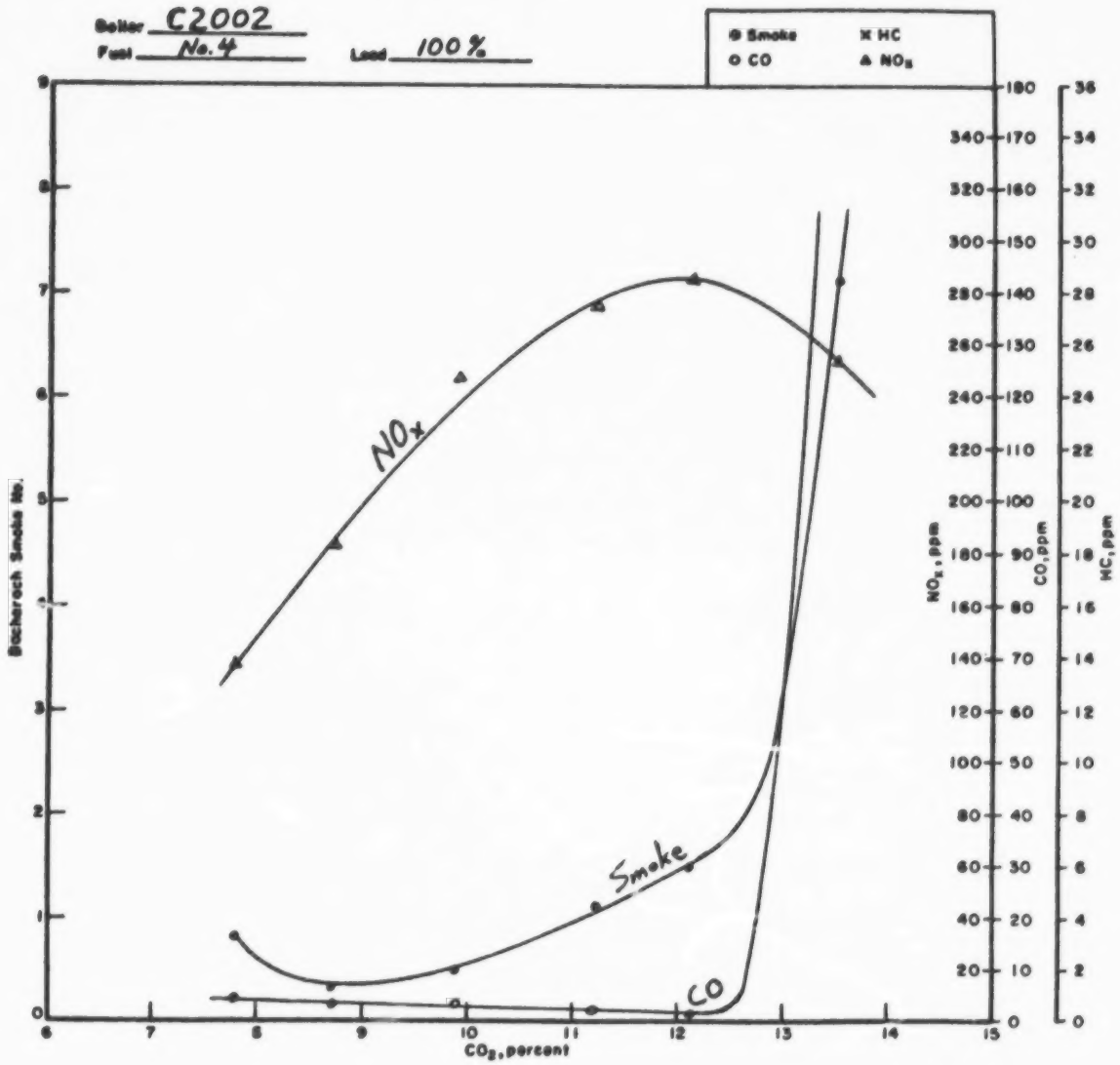
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

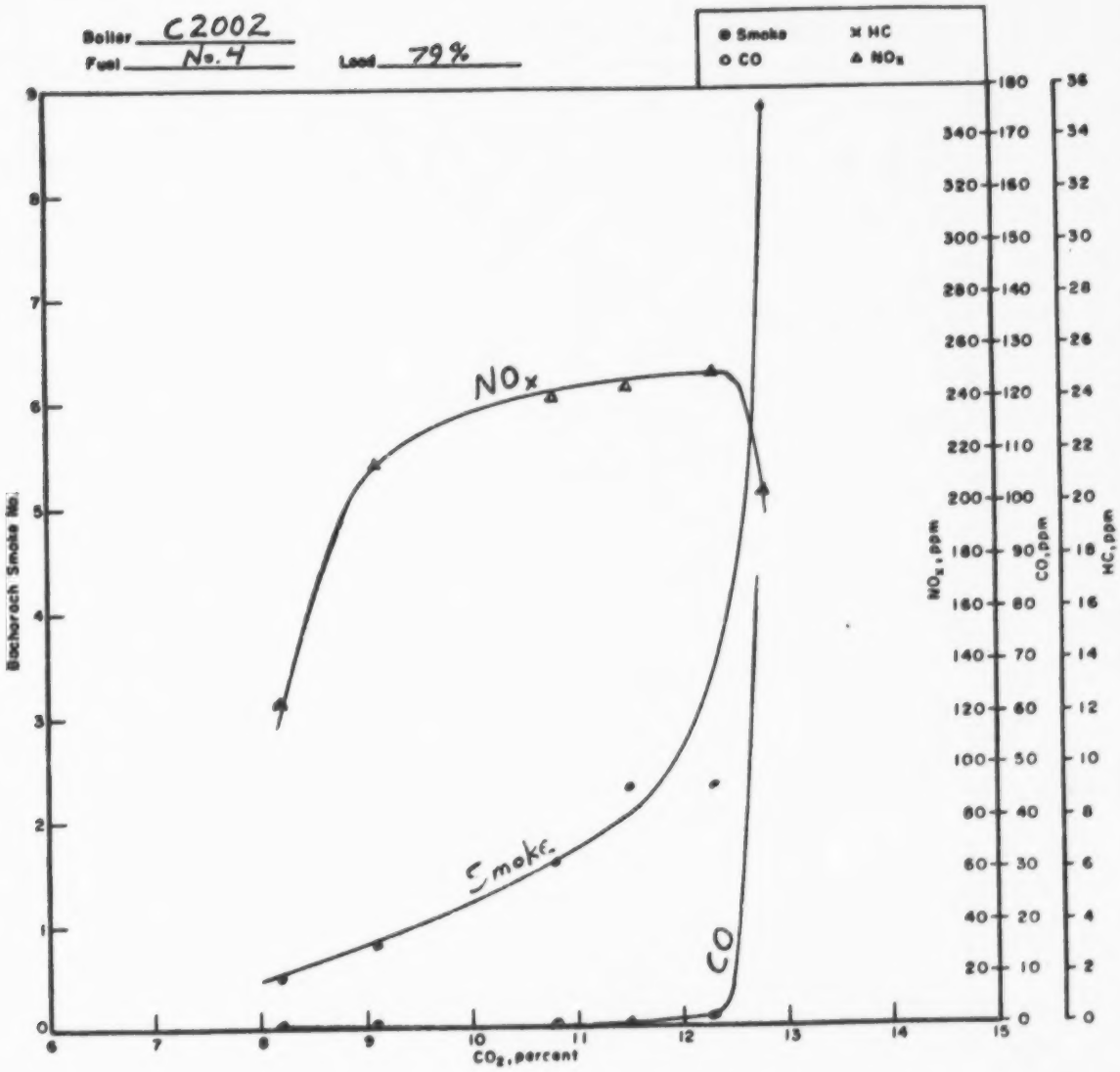
Boiler C2002 Fuel No. 4

Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/sm³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
99.	26.0	—	0.8	7.8	10.7	670	4.		139.	139.	540.	—	—
			0.3	8.7	9.6	665	3.		179.	183.	610.	—	—
			0.5	9.9	7.7	642	3.		246.	248.	710.	—	—
			1.1	11.2	5.8	620	2.		270.	276.	810.	—	—
			1.5	12.1	4.4	610	1.		280.	286.	850.	—	—
			7.1	13.5	2.7	595	607.		240.	254.	980.	—	—
78.	20.6	—	0.5	8.2	9.2	620	0		126.	126.	600.	—	—
			0.8	9.1	7.8	600	0		212.	217.	690.	—	—
			1.6	10.8	5.6	572	0		238.	241.	810.	—	—
			2.3	11.5	4.5	555	0		243.	246.	860.	—	—
			2.3	12.3	4.3	540	2.		247.	251.	900.	32.8	46.9
			8.8	12.8	2.0	535	>1230.		202.	205.	1010.	—	—
69.	18.2	—	1.1	8.0	9.8	580	1.		168.	172.	595.	—	—
			1.0	9.9	7.2	555	0		203.	205.	750.	—	—
			1.4	10.9	6.0	530	1.		211.	213.	822.	—	—
			2.8	12.0	4.3	513	0		216.	225.	896.	—	—
			8.8	13.3	1.3	462	>1230.		149.	125.	1140.	—	—
57.	15.1	—	3.6	5.8	12.8	532	24.		104.	104.	400.	—	—
			0.8	8.3	9.3	492	3.		172.	172.	620.	—	—
			1.3	10.1	6.7	460	2.		206.	206.	760.	—	—
			2.8	11.9	4.0	447	1.		211.	215.	886.	1.4[a]	64.1[a]
			8.8	13.0	1.8	422	>1230.		169.	169.	1040.	—	—

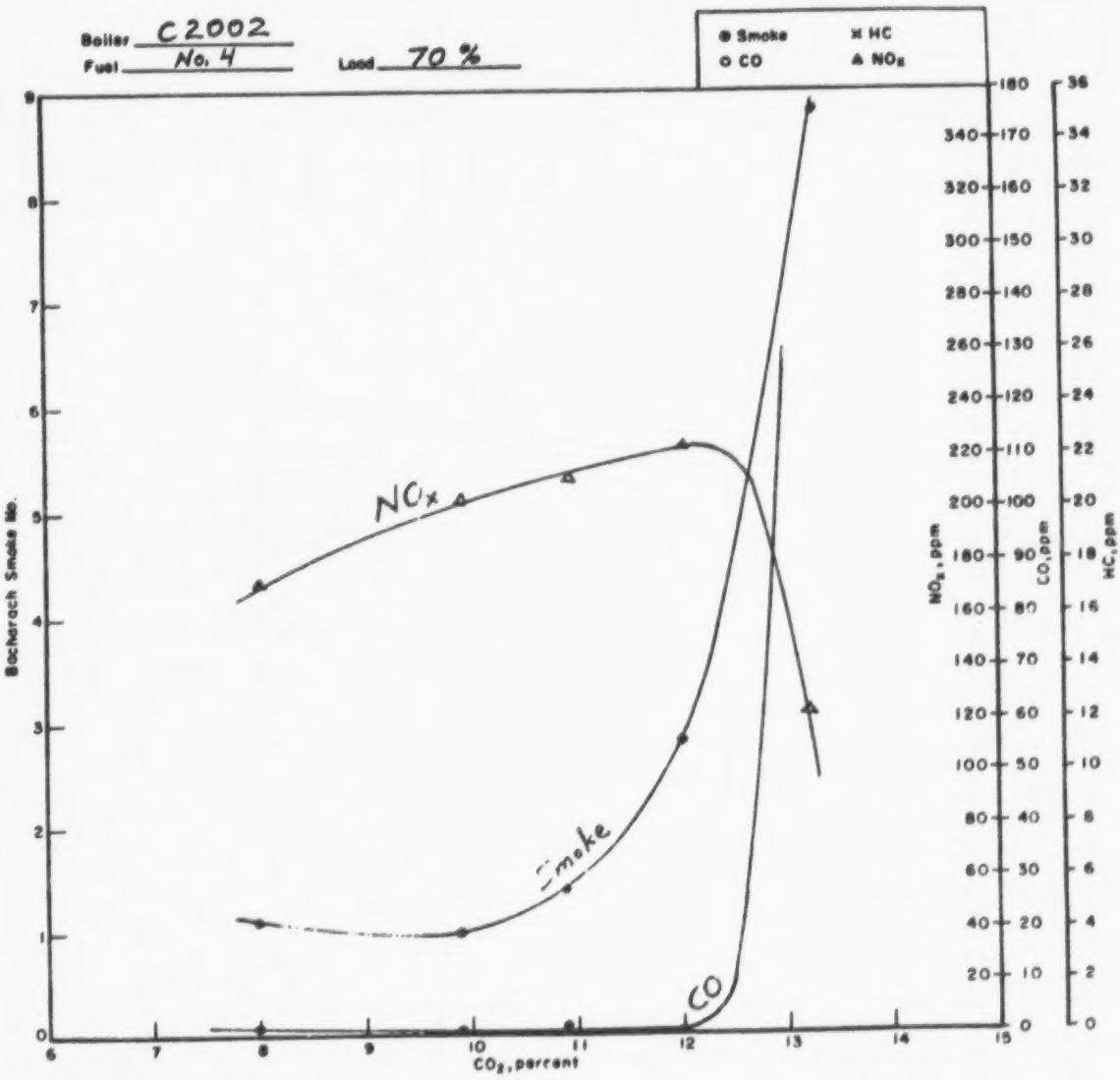
(a) Data suspect.



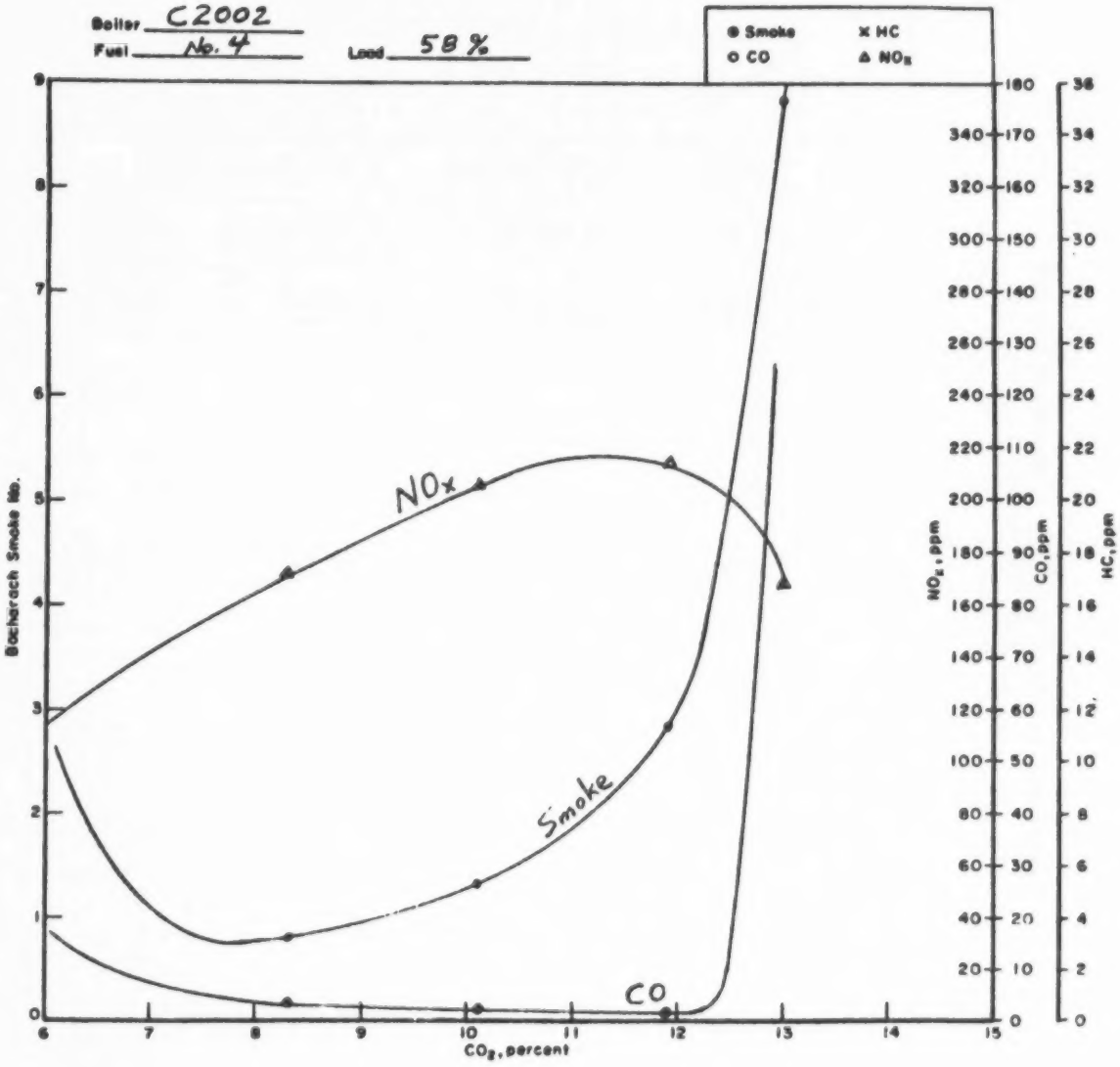
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

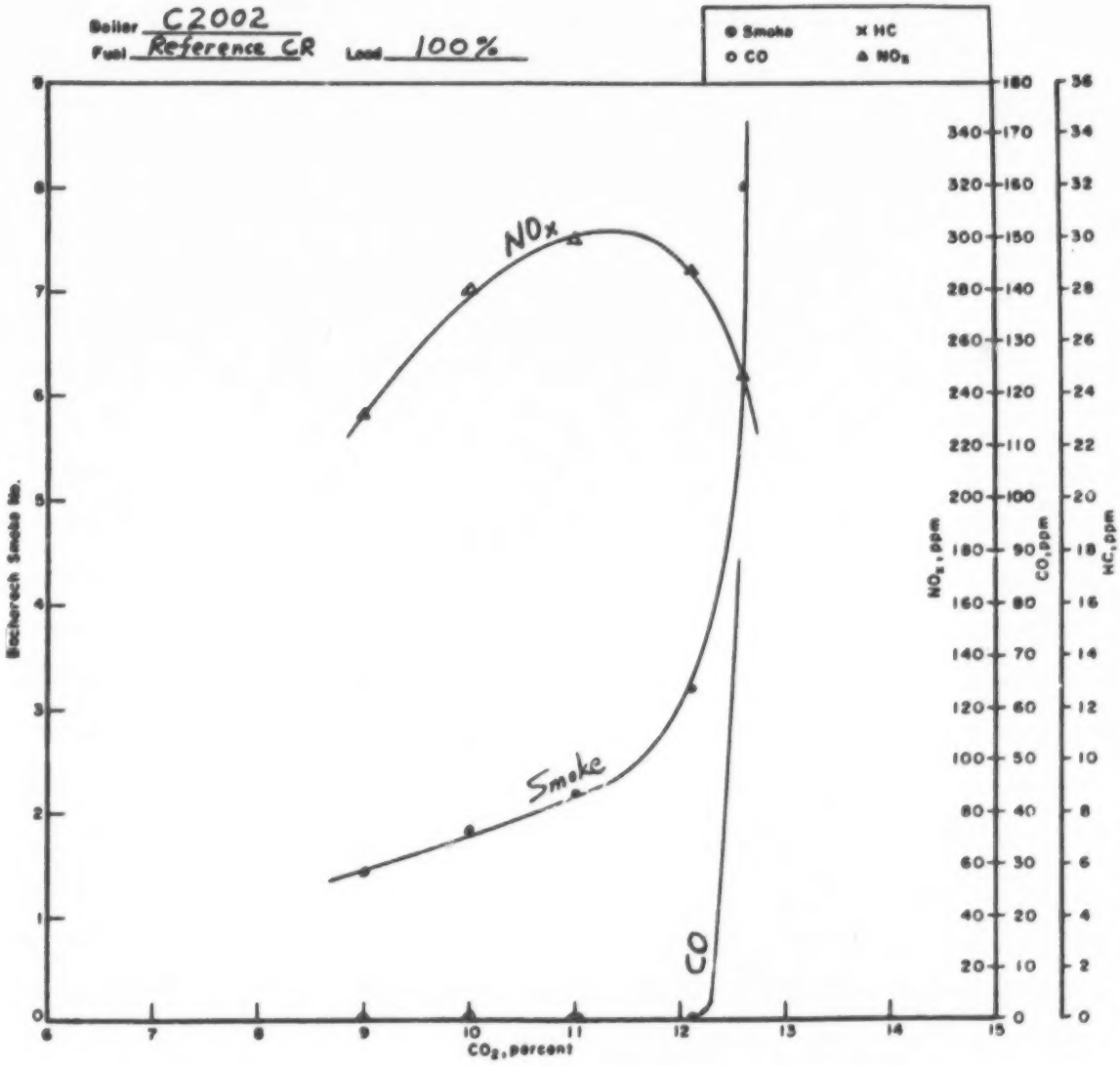


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

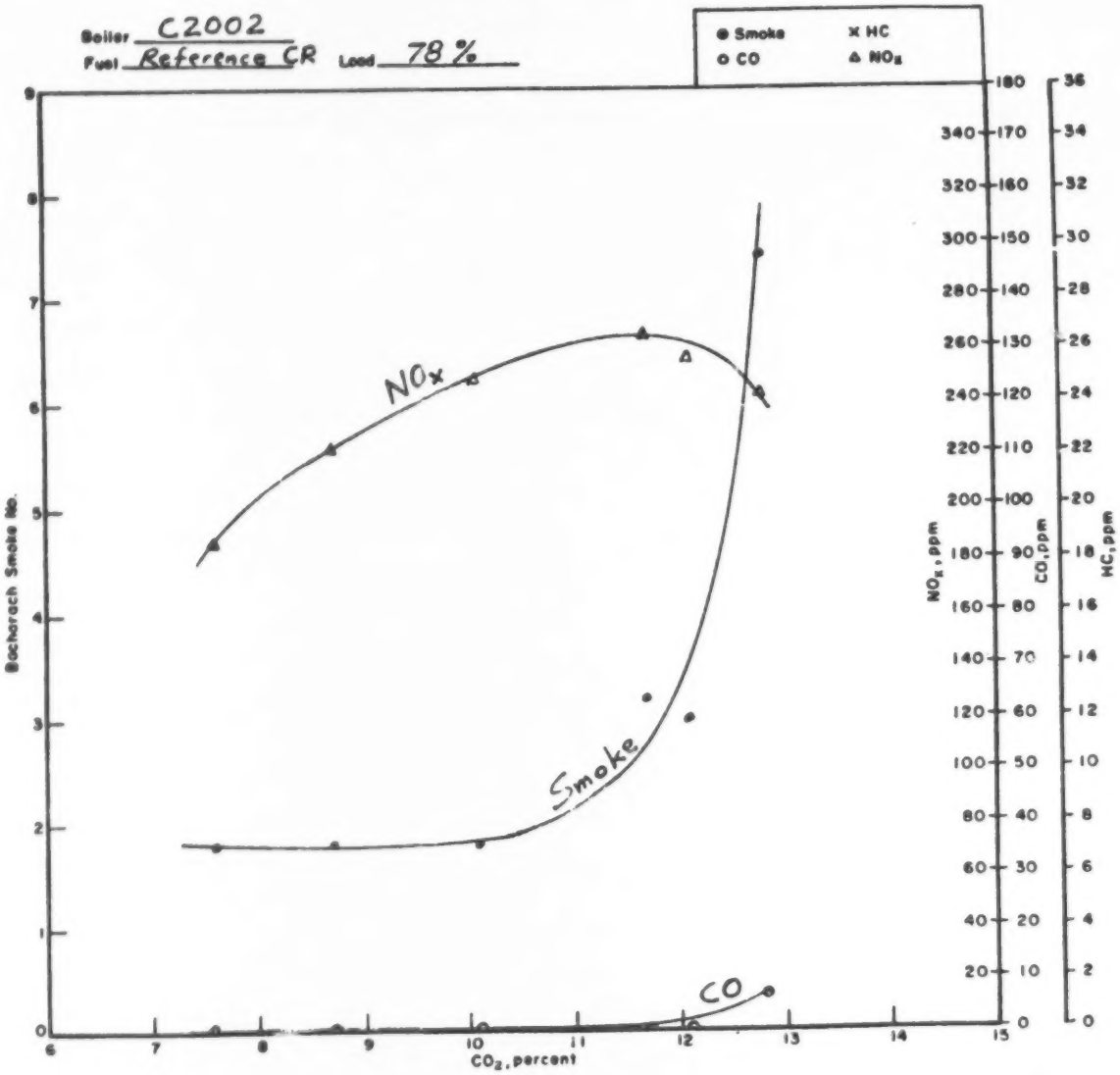
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2002 Fuel CR

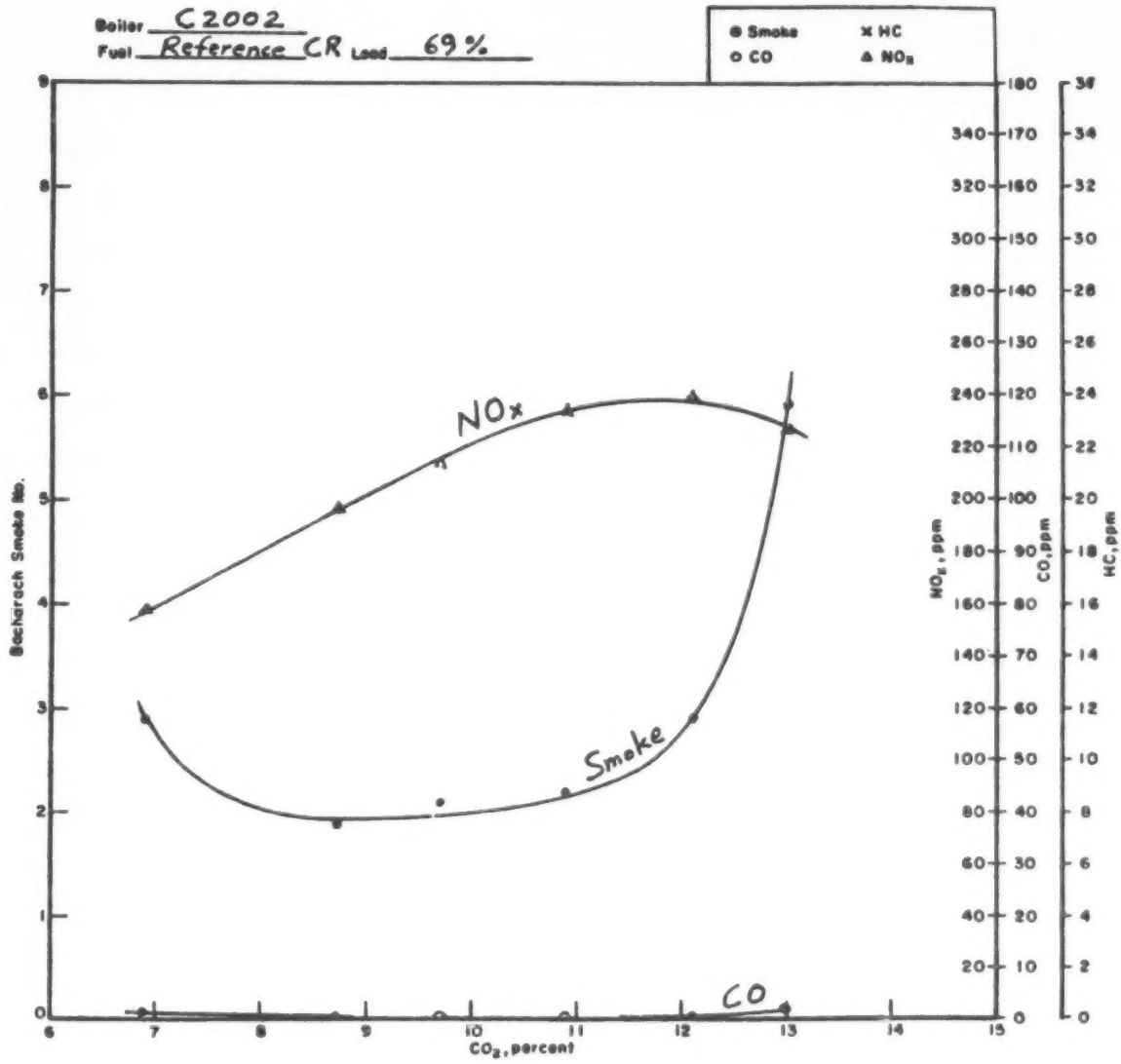
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/sm^3	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
99.	26.0	195	1.4	9.0	8.2	704	0		228.	232.	370.	–	–
			1.8	10.0	6.8	680	0		273.	280.	430.	–	–
			2.2	11.0	5.6	666	0		283.	300.	480.	–	–
			3.2	12.1	4.2	645	0		286.	288.	530.	–	–
			8.0	12.6	3.6	625	780.		241.	247.	550.	–	–
78.	20.4	195	1.8	7.6	10.3	630	0		181.	188.	320.	–	–
			1.8	8.7	9.0	610	0		219.	223.	370.	–	–
			1.8	10.1	6.9	582	0		248.	250.	420.	–	–
			3.2	11.7	4.5	554	0		260.	266.	500.	–	–
			3.0	12.1	4.[illegible]	552	0		257.	257.	520.	103.	117.
			7.4	12.8	3.2	532	7.		237.	242.	566.	–	–
69.	18.0	203	2.9	6.9	11.2	620	1.		152.	159.	270.	–	–
			1.9	8.7	9.0	580	0		196.	198.	350.	–	–
			2.1	9.7	8.0	562	0		211.	214.	400.	–	–
			2.2	10.9	6.3	548	0		228.	234.	460.	–	–
			2.9	12.1	4.8	530	0		241.	240.	500.	–	–
			5.9	13.0	3.2	525	2.		222.	227.	540.	–	–
58.	15.1	200	5.0	6.2	13.1	575	5.		125.	129.	240.	–	–
			1.8	8.5	10.6	532	1.		190.	190.	360.	–	–
			1.9	9.6	8.6	508	0		202.	207.	390.	–	–
			2.0	10.8	6.9	492	0		222.	222.	460.	–	–
			3.1	11.9	5.4	430	0		228.	228.	500.	–	–
			7.2	13.4	3.1	460	53.		200.	202.	550.	–	–



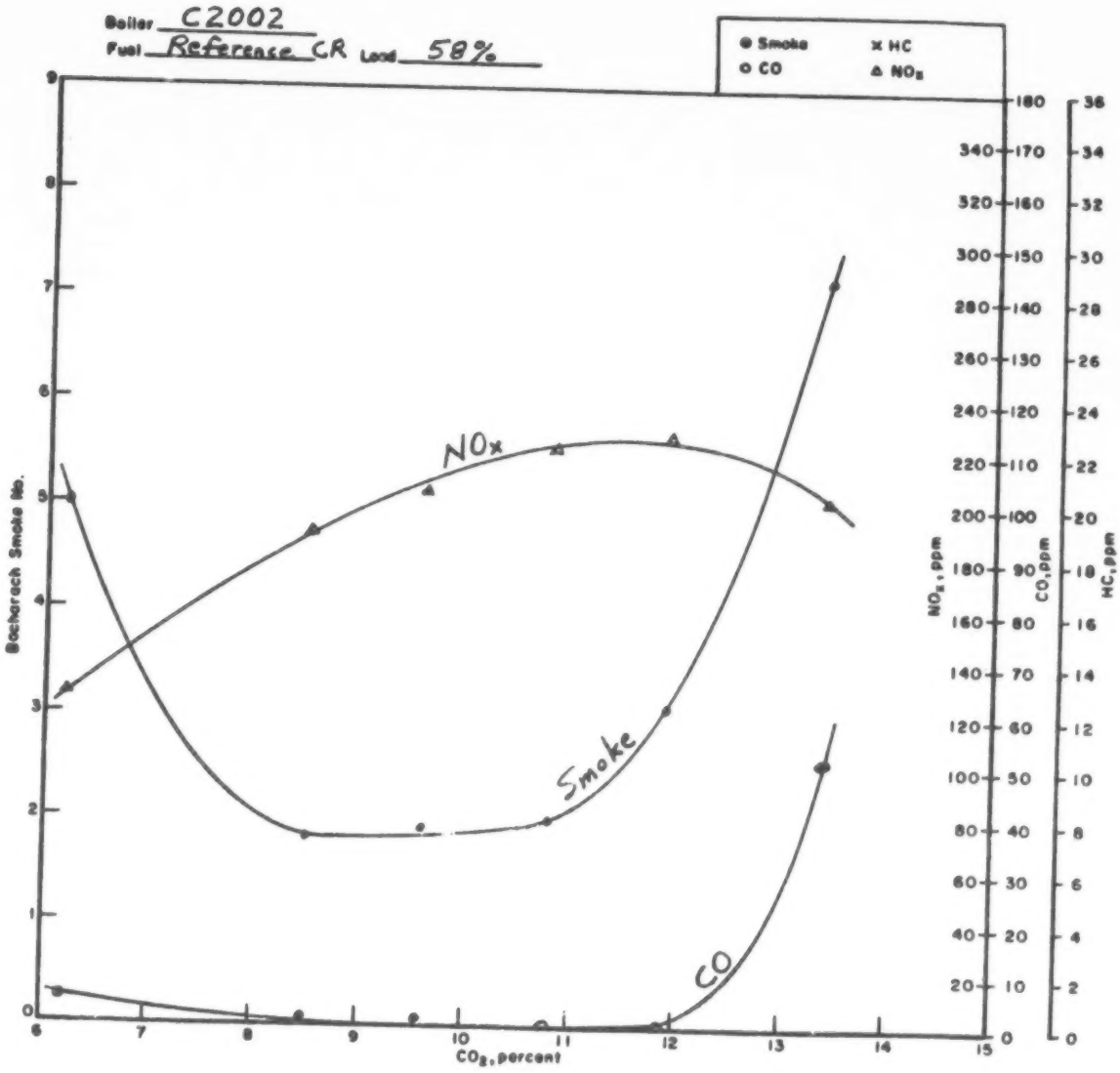
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

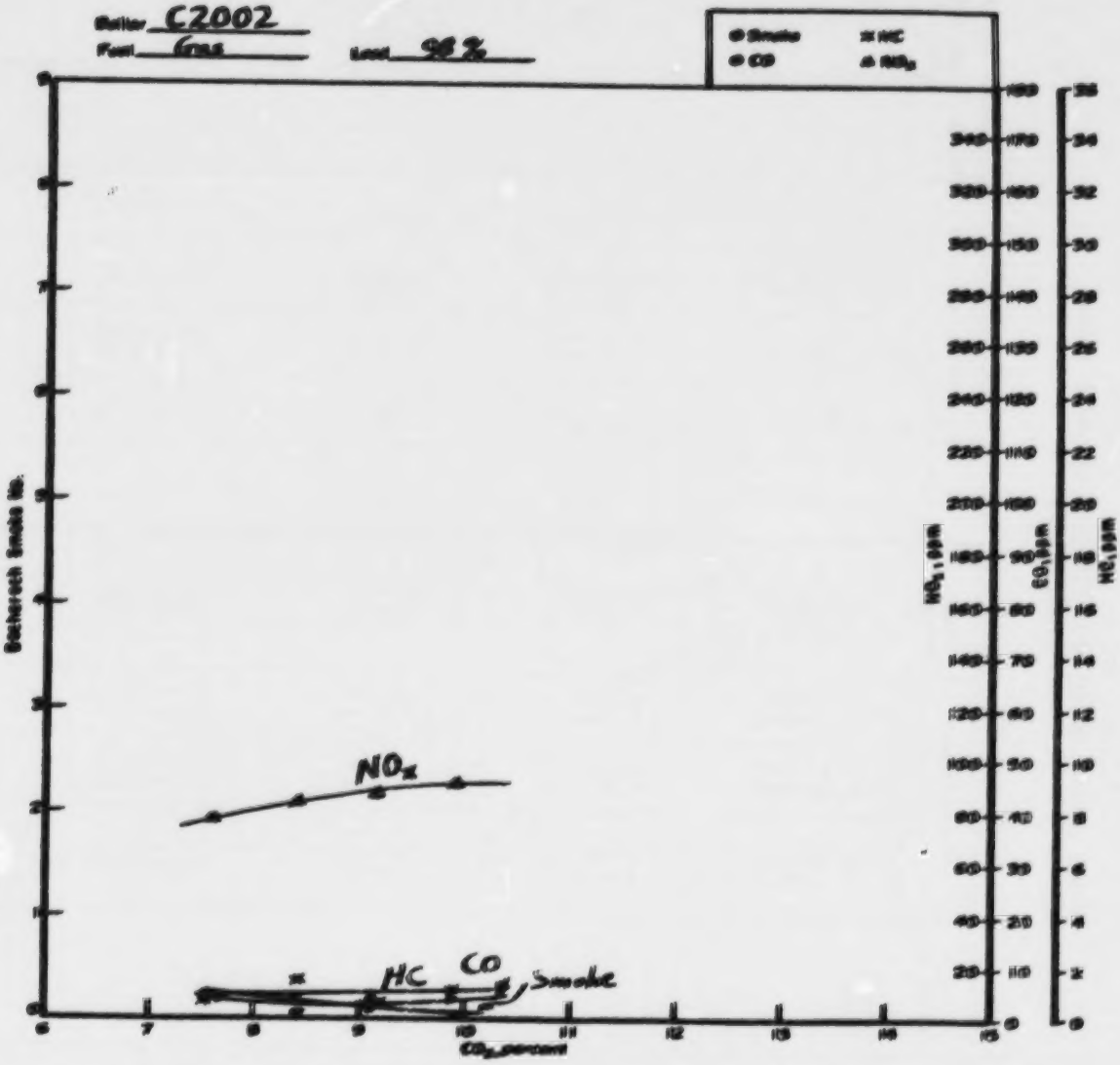


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

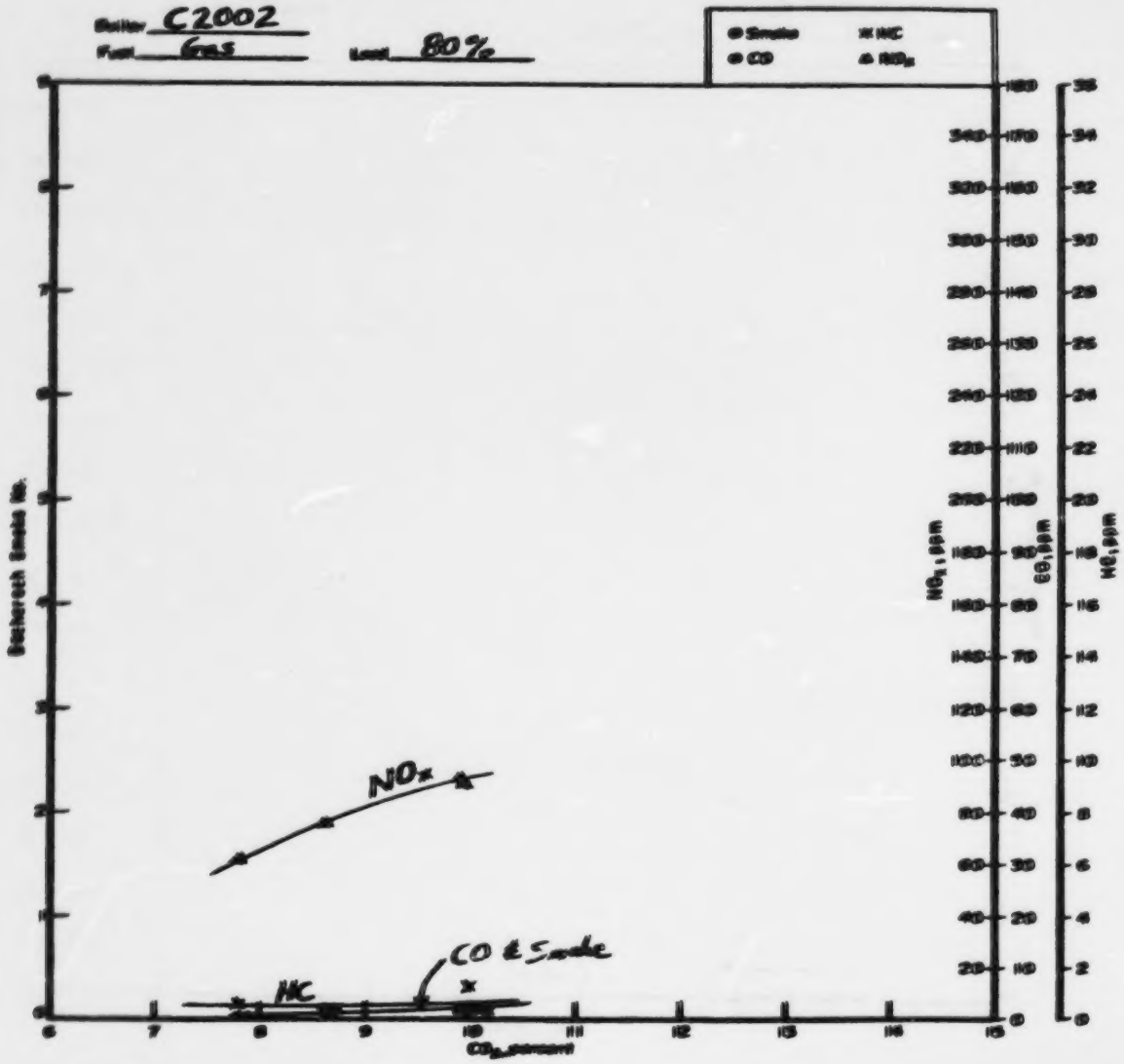
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2002 Fuel Gas

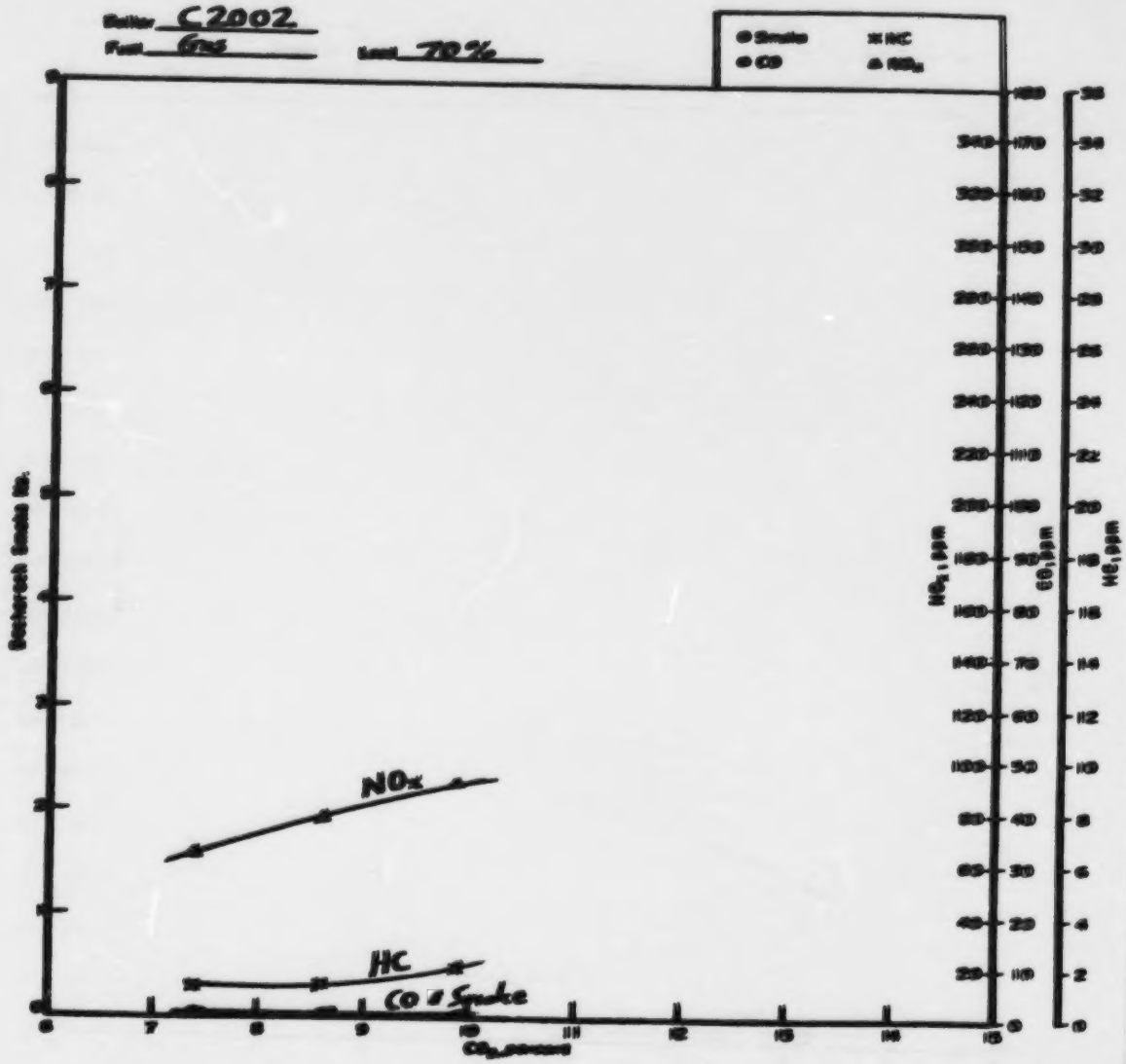
Load, percent	Firing Rate, cfh	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/m³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
99.	3690.	—	0.2	7.6	7.6	685	3.	0.6	80.	77.	0	—	—
			0.2	8.4	6.3	655	1.	1.5	83.	83.	0	—	—
			0.1	9.1	4.8	629	3.	0.6	85.	86.	0	—	—
			0.0	9.9	3.3	620	3.	1.1	91.	91.	0	—	—
82.	3037.	—	0.0	7.8	7.5	585	0	0.6	59.	62.	0	—	—
			0.1	8.6	6.2	590	0	0.3	77.	77.	0	—	—
			0.1	10.0	3.3	585	1.	0.3	93.	94.	0	2.4	11.4
			0.0	10.0	3.2	578	1.	1.3	91.	92.	0	—	—
71.	2650.	—	0.0	7.4	7.6	530	0	1.1	63.	63.	0	—	—
			0.0	8.6	5.5	518	0	1.2	78.	78.	0	—	—
			0.0	9.9	3.0	508	0	2.0	89.	91.	0	—	—
67.	2480.	—	0.0	6.9	9.0	500	1.	1.5	49.	49.	0	—	—
			0.0	8.3	6.3	492	0	1.6	76.	76.	0	—	—
			0.0	9.1	4.5	485	0	1.5	89.	89.	0	—	—
			0.0	9.9	3.2	480	6.	1.5	86.	89.	0	—	—



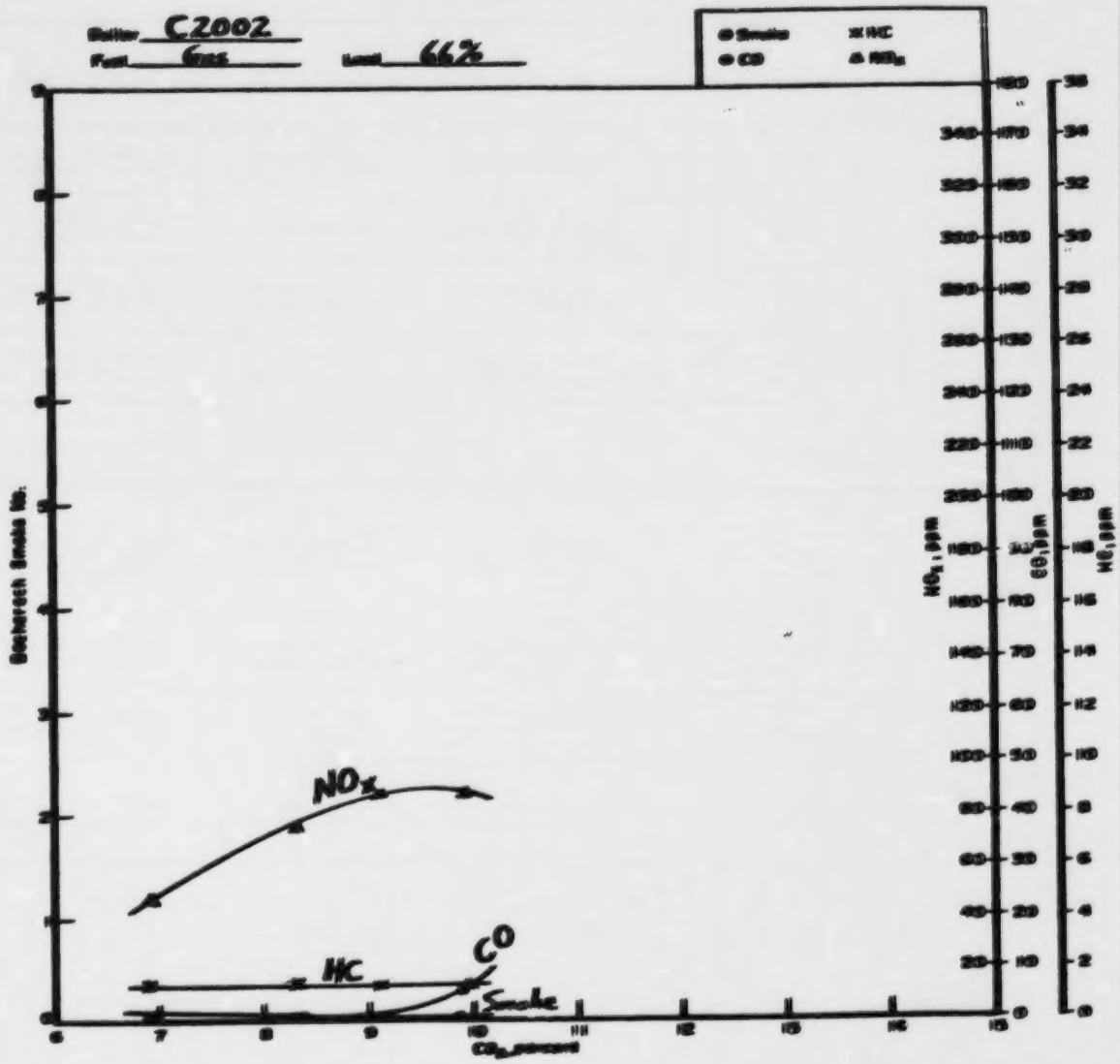
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

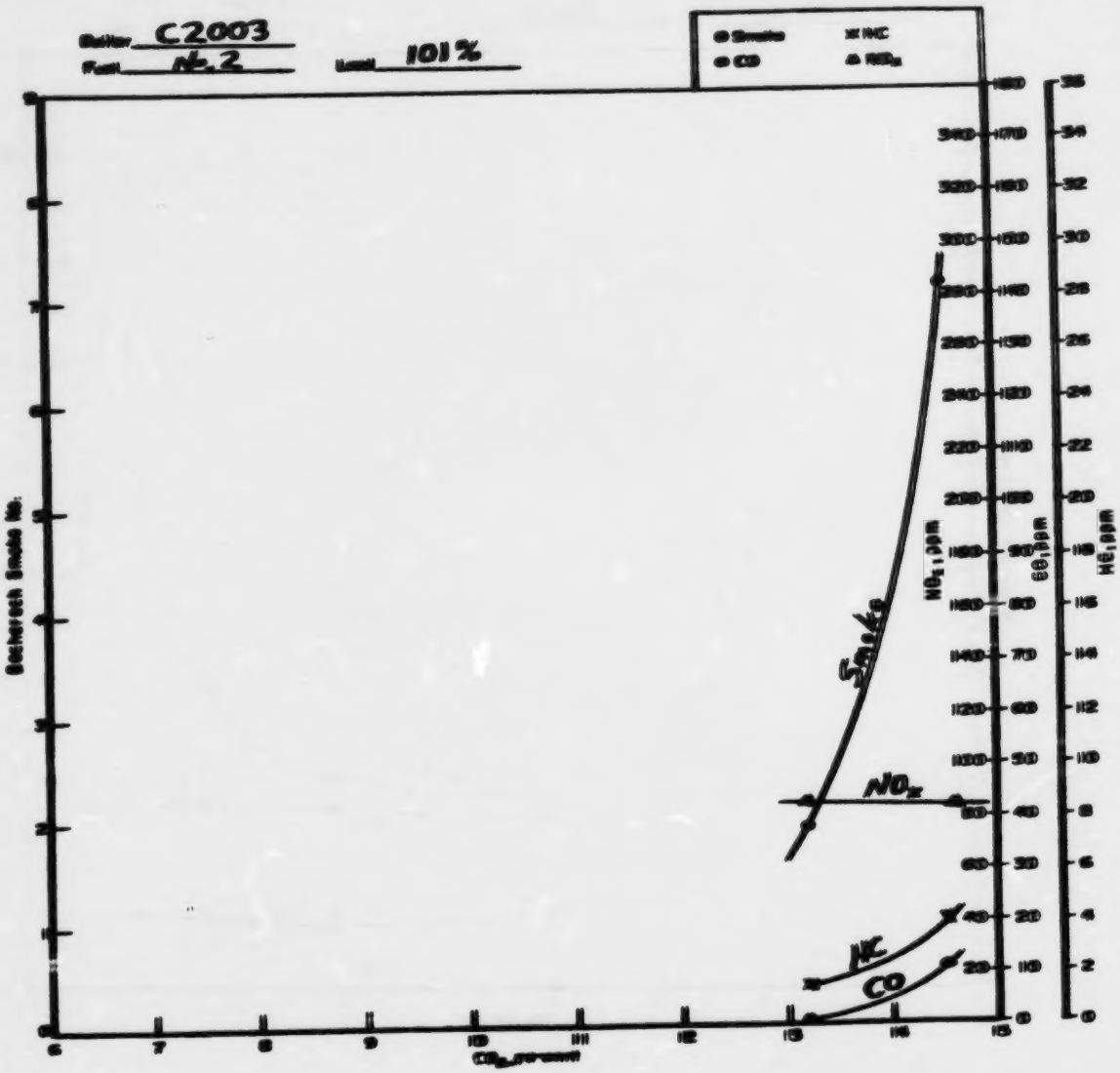


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

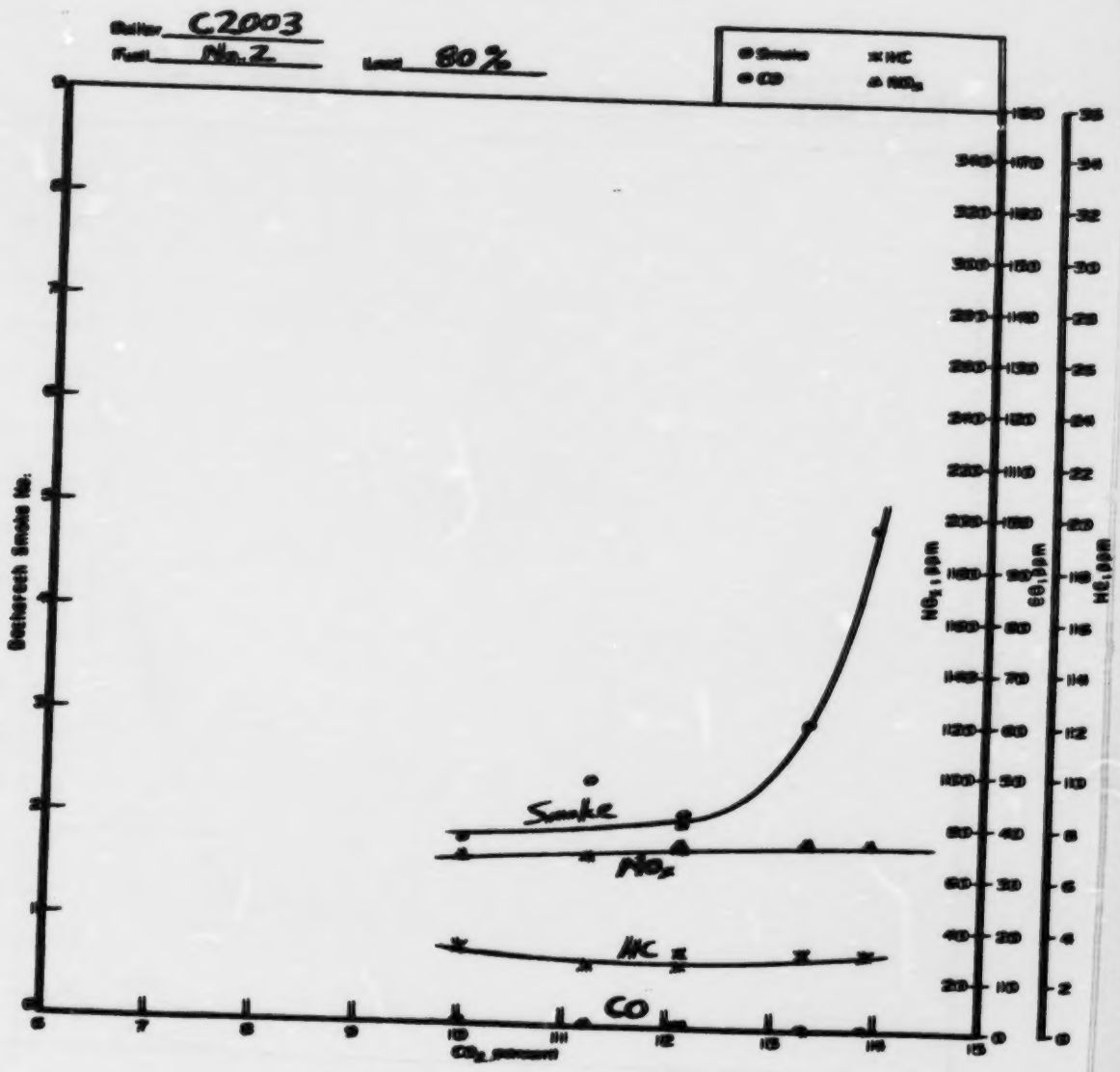
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2003 Fuel No. 2

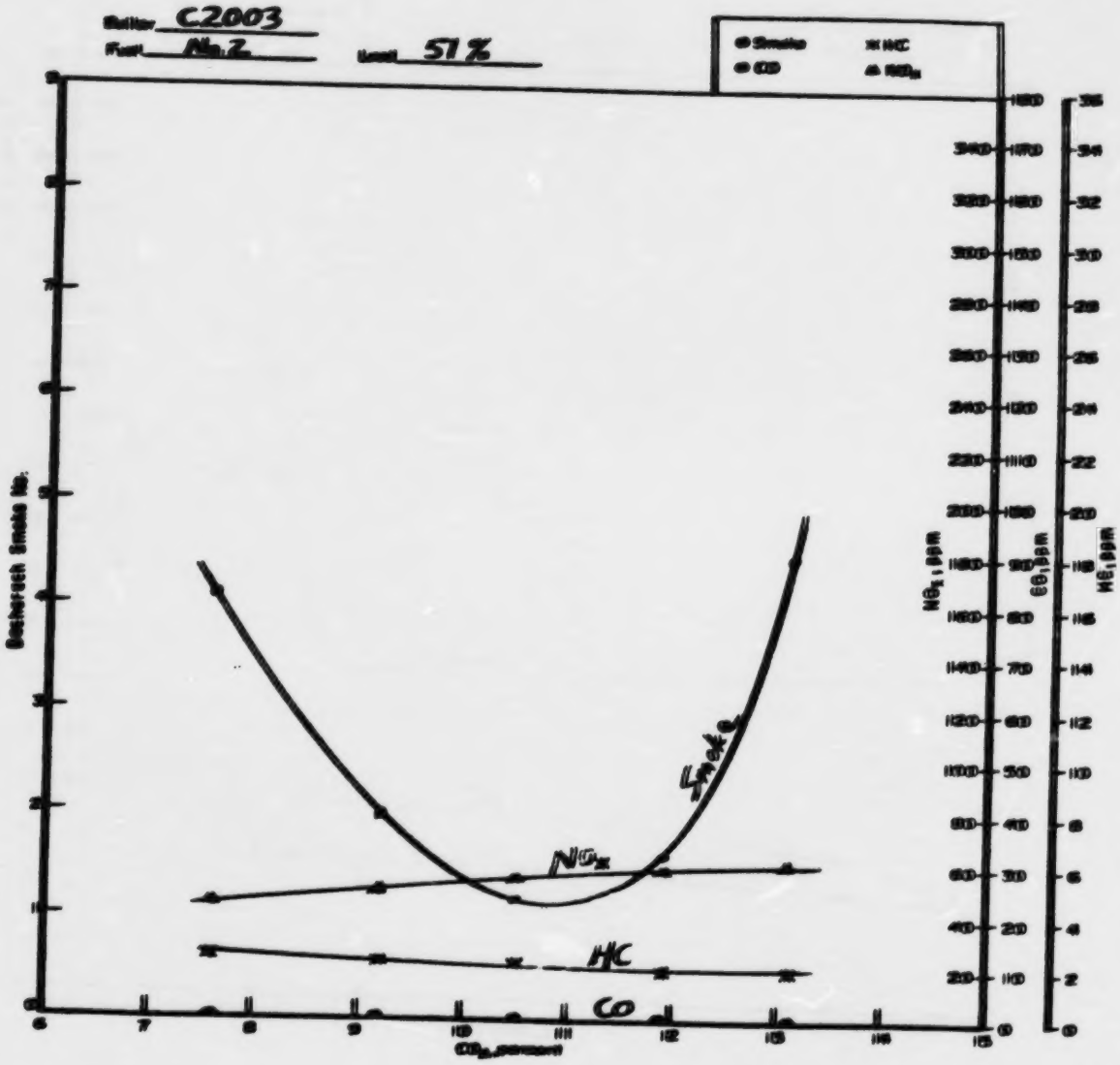
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/m³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
101.	90.5	118	1.9	13.2	3.2	308	0	1.5	84.	86.	92.	=	=
			7.1	14.5	1.6	302	11.	4.0	86.	85.	105.	=	=
80.	71.5	88	1.8	10.8	7.7	315	0	3.0	64.	66.	70.	=	=
			2.4	11.2	6.0	358	0	2.5	65.	67.	74.	=	=
			2.1	12.1	5.0	350	0	2.5	70.	71.	80.	=	=
			2.0	12.1	4.9	352	0	3.0	70.	70.	81.	11.2	22.2
			3.0	12.3	3.3	350	0	3.0	71.	73.	88.	=	=
			4.9	12.9	2.6	347	0	3.0	70.	73.	94.	=	=
51.	45.3	78	4.1	7.6	10.9	320	0	2.5	44.	46.	54.	=	=
			2.0	9.2	8.3	309	0	2.3	50.	51.	64.	=	=
			1.2	10.5	6.5	305	0	2.2	54.	56.	73.	=	=
			1.6	11.9	4.4	300	0	2.0	58.	59.	83.	=	=
			4.5	13.1	2.9	298	0	2.0	58.	61.	92.	=	=
35	31.0	78	2.9	6.6	11.0	281	3	5.0	36.	43.	48.	=	=
			3.5	7.5	10.9	278	1.	4.0	41.	44.	52.	=	=
			2.2	9.7	7.6	258	0	3.0	48.	50.	70.	=	=
			3.2	12.0	4.3	264	0	4.5	54.	55.	84.	=	=
			4.0	12.6	3.8	258	0	4.0	54.	56.	84.	=	=
			4.0	13.0	3.0	260	0	4.0	55.	56.	92.	=	=



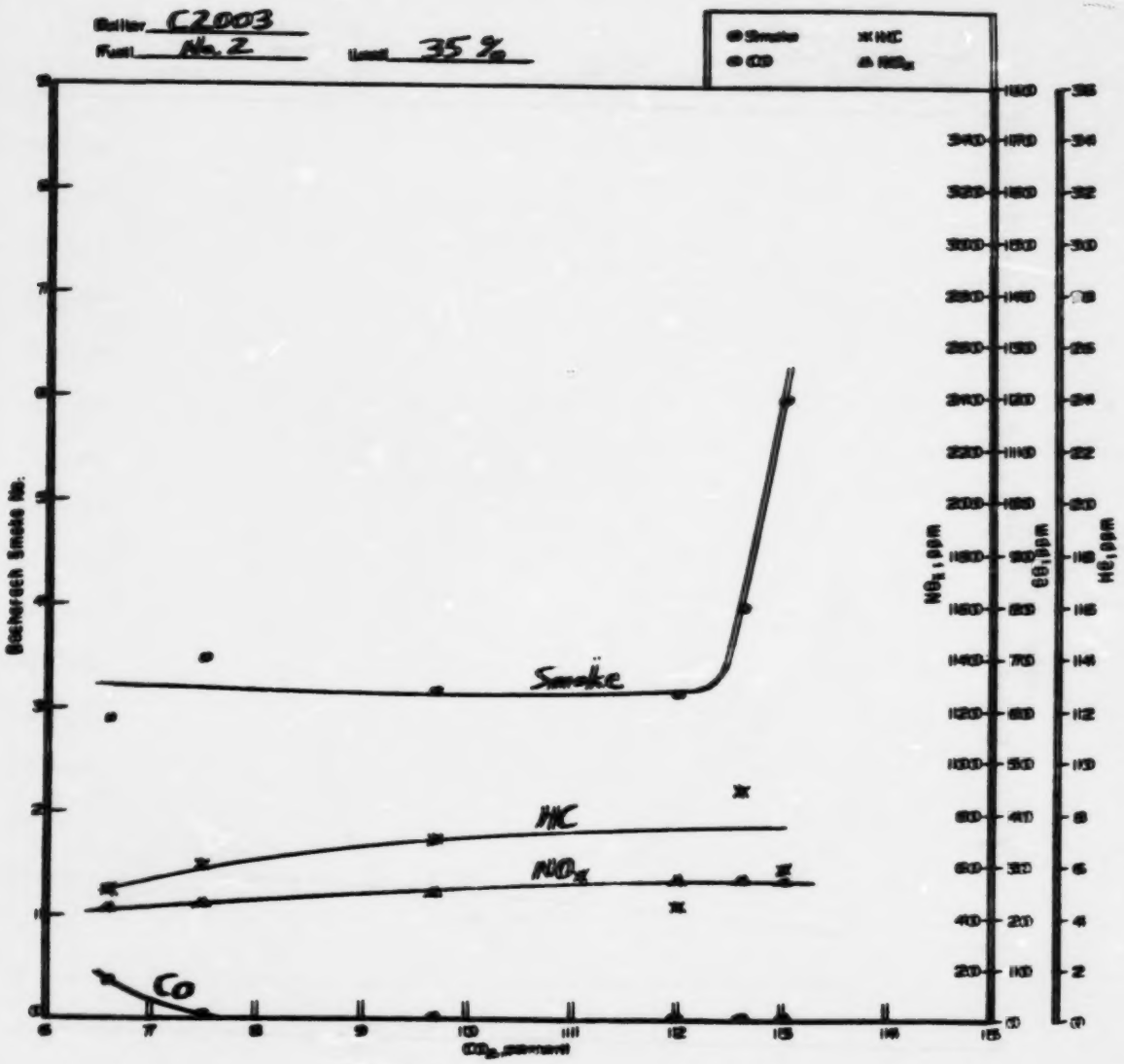
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

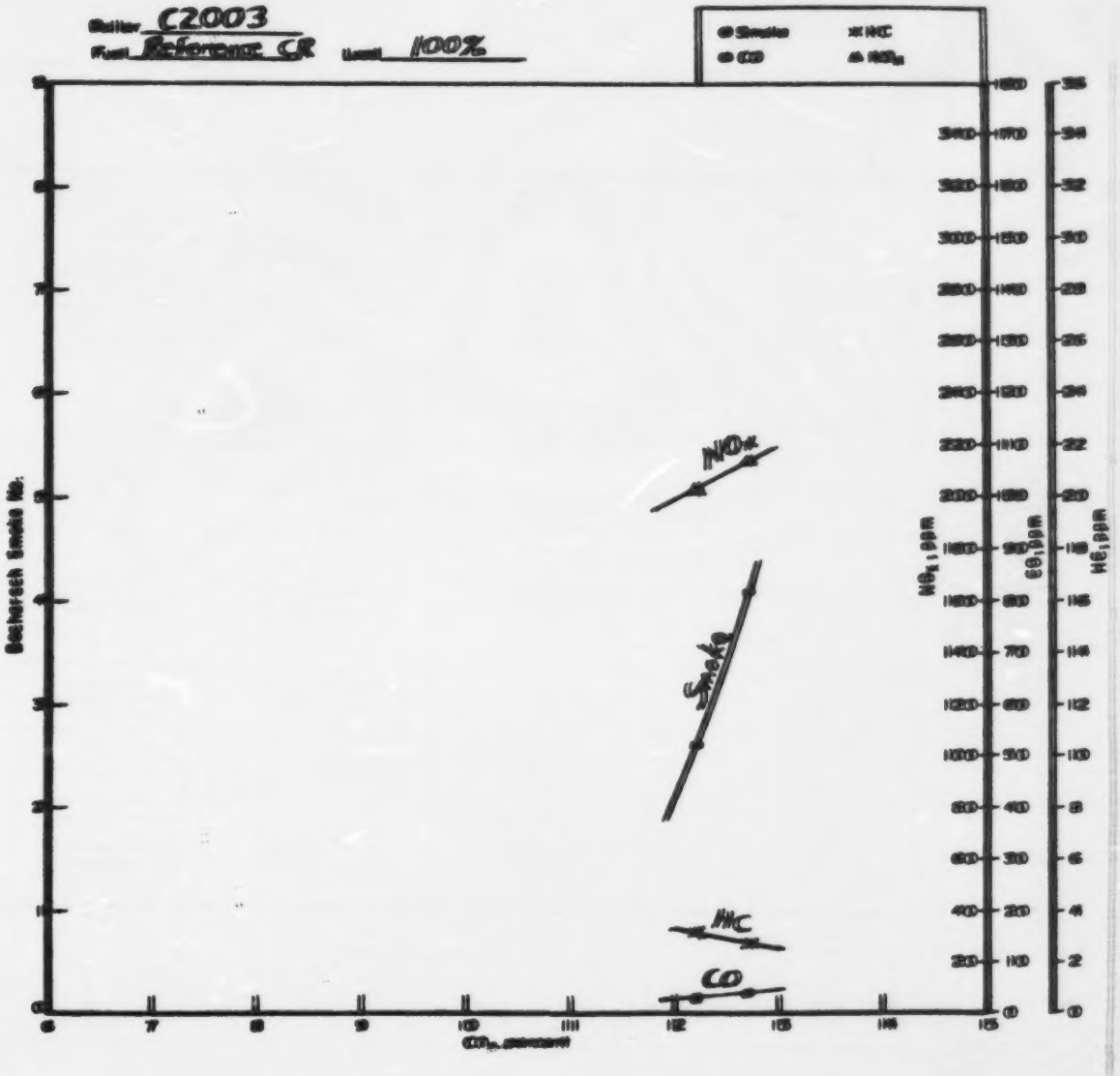


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

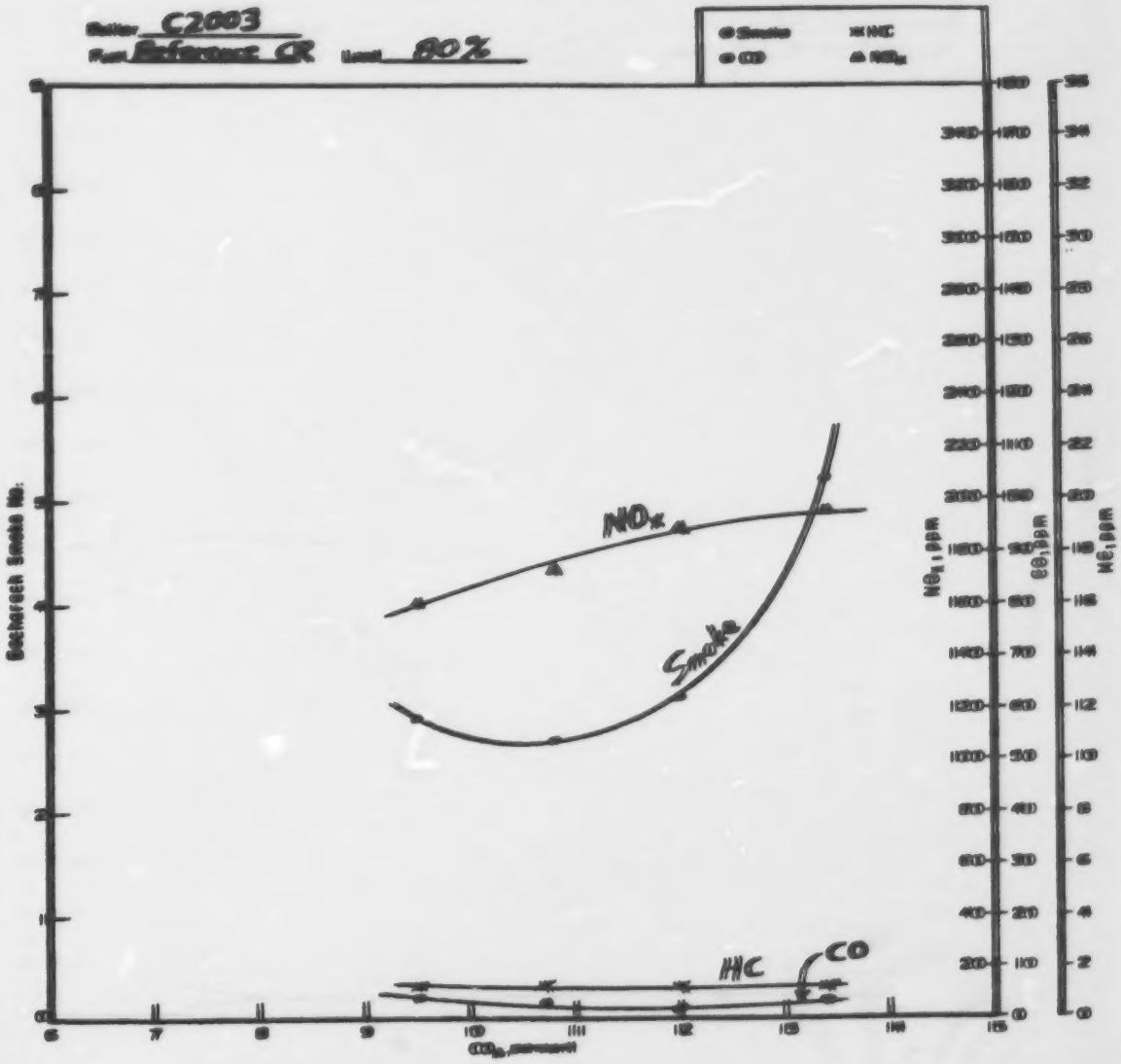
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2003 Fuel CR

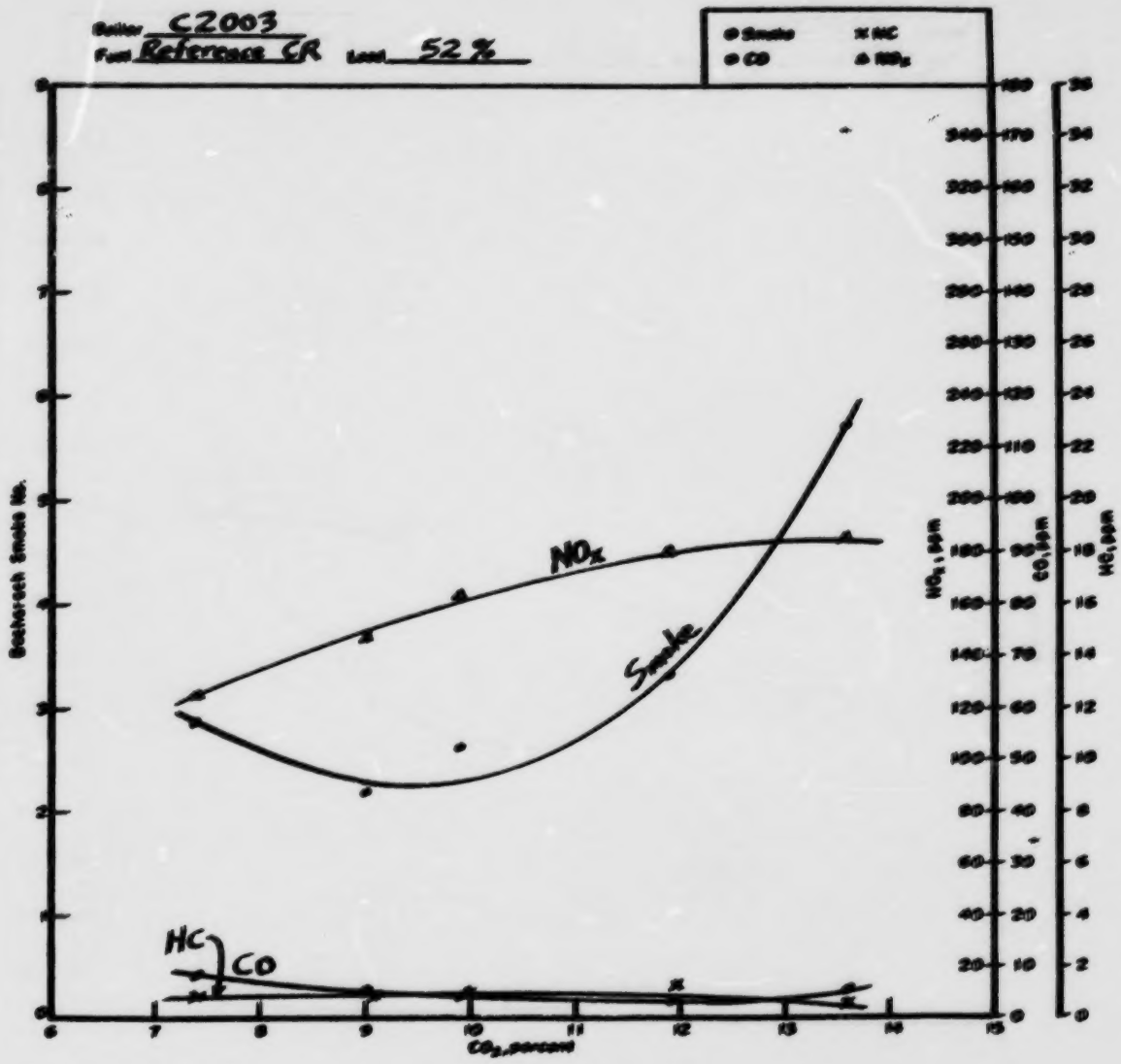
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/sm³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
97	83.0	140	2.6	12.2	4.2	302	3.	3.1	199.	203.	520.	=	=
			4.1	12.7	2.5	320	4.	2.8	212.	215.	500.	=	=
72	66.0	143	2.9	9.5	8.1	310	4.	1.2	156.	161.	400.	=	=
			2.7	10.8	6.2	352	3.	1.2	171.	173.	414.	=	=
			3.2	12.0	4.5	340	2.	1.2	189.	190.	520.	286.	305.
			5.2	13.4	2.6	345	3.	1.2	193	193	584.	=	=
50.	43.0	140	2.9	7.4	11.3	315	8.	0.9	124.	126.	296.	=	=
			2.2	9.0	9.2	310	5.	0.9	140.	142.	370.	=	=
			2.6	9.9	7.5	305	4.	1.0	160.	162.	410.	=	=
			3.3	11.9	4.9	296	3.	1.2	180.	180.	500.	=	=
			5.7	13.6	2.6	292	5.	0.5	184.	185	570.	=	=
33.	26.2	139	4.1	6.2	12.4	280	25.	0.4	95.	99.	236.	=	=
			3.7	7.2	11.3	279	9.	0.6	112.	114.	280.	=	=
			3.8	8.6	9.4	270	6.	0.9	131.	131.	310.	=	=
			3.9	9.3	8.3	215	6.	1.2	138.	141.	390.	=	=
			6.4	11.8	5.1	210	3.	1.6	150.	154.	500.	=	=



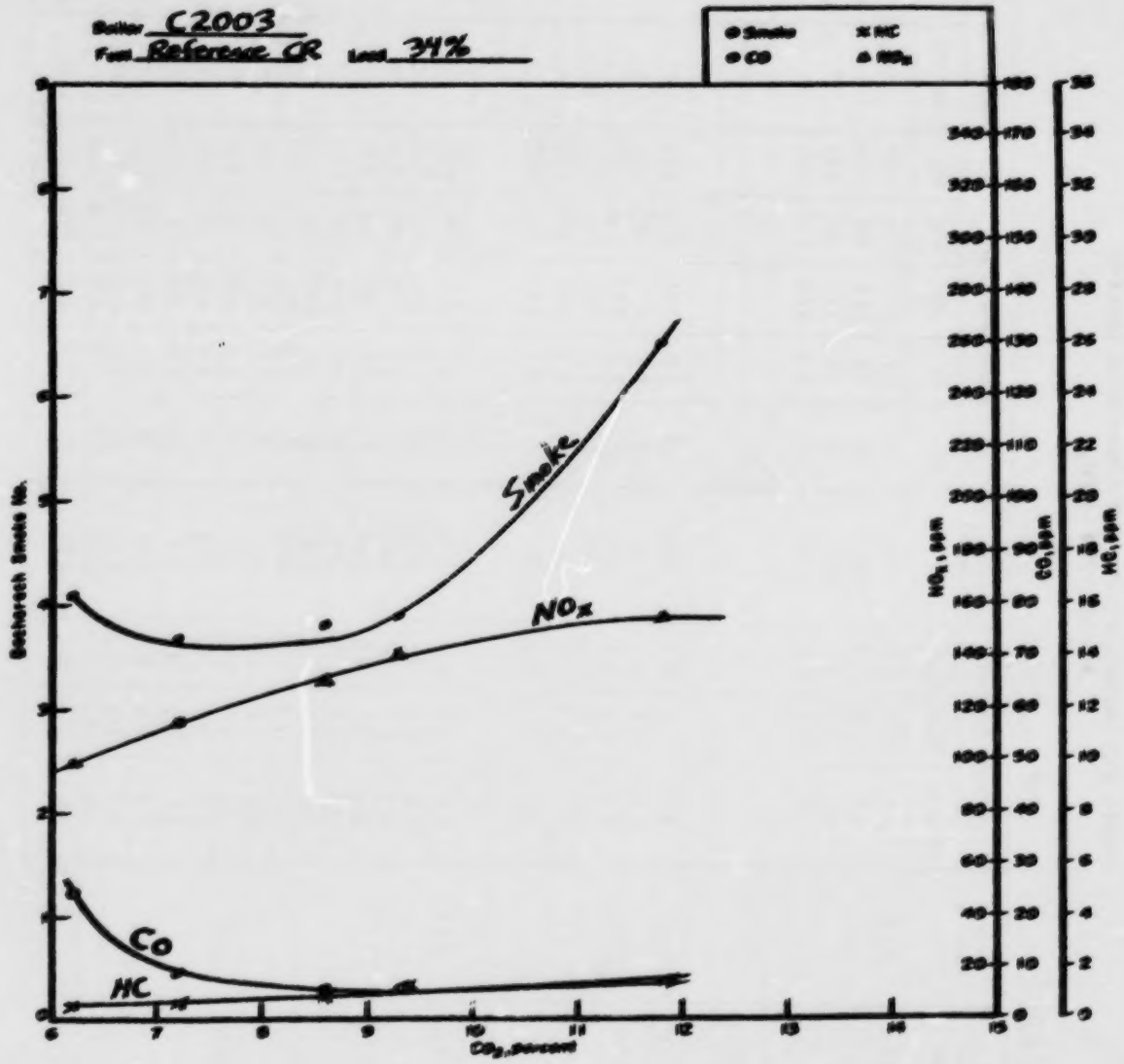
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

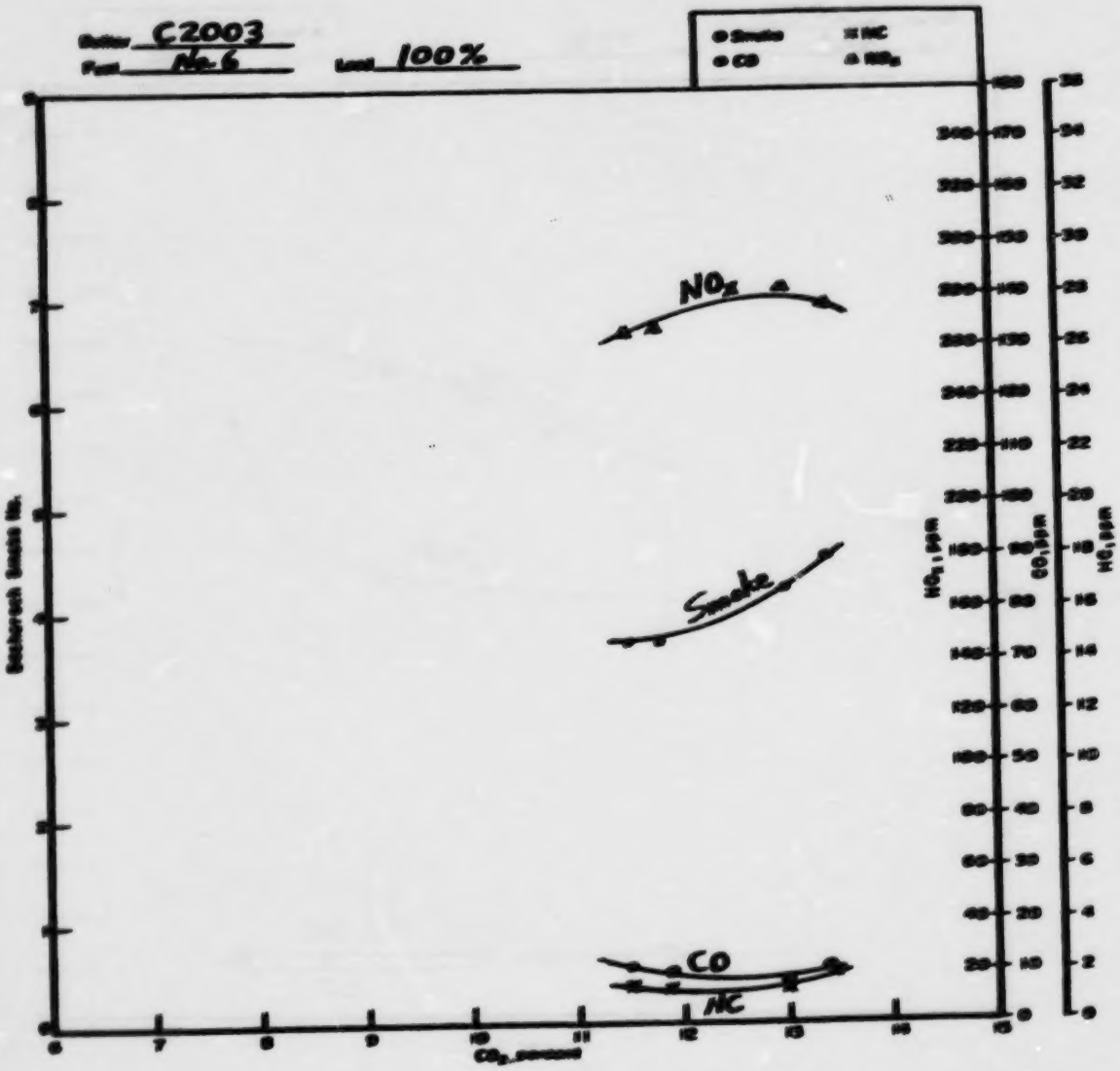


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

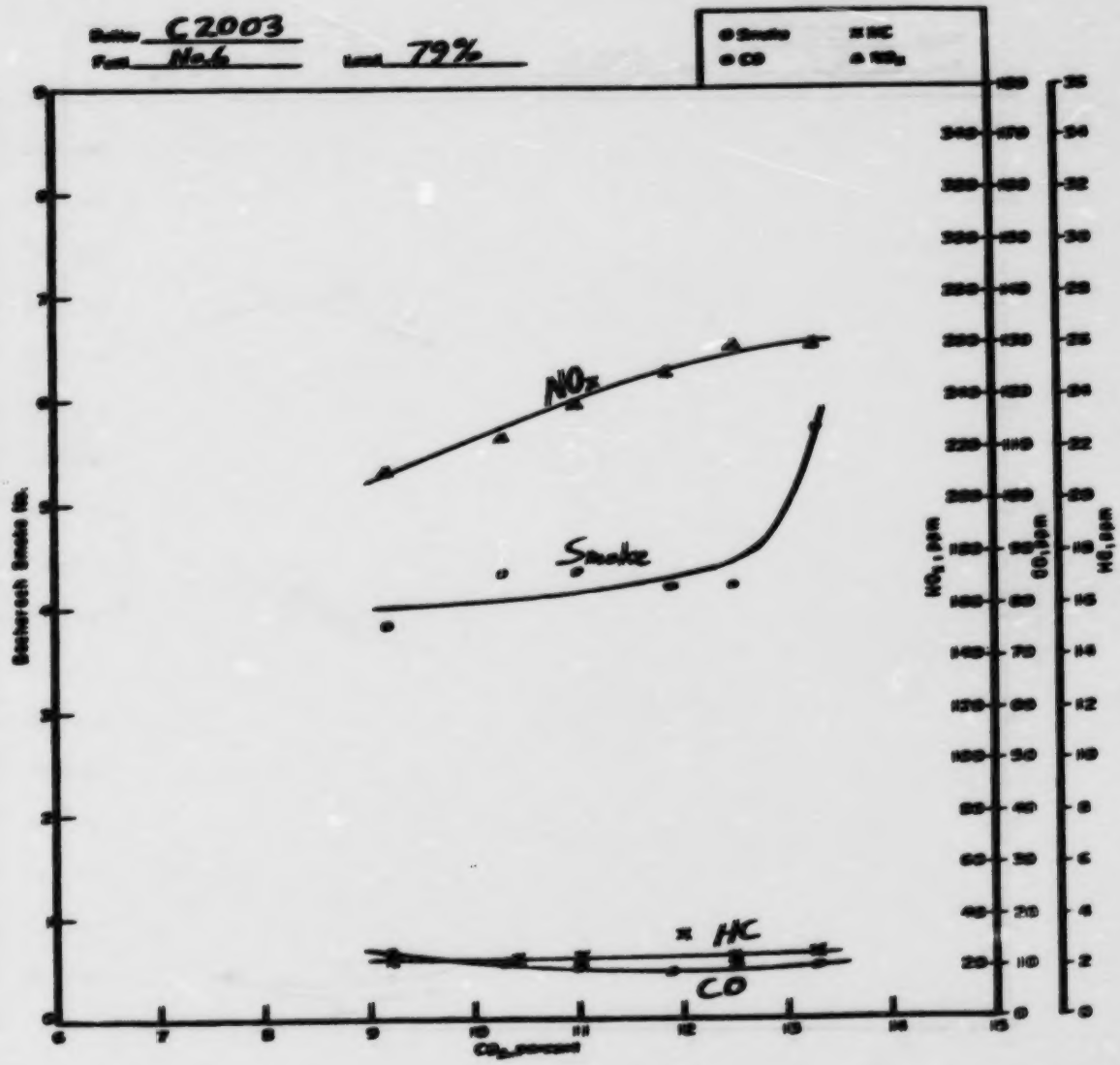
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2003 Fuel No. 6

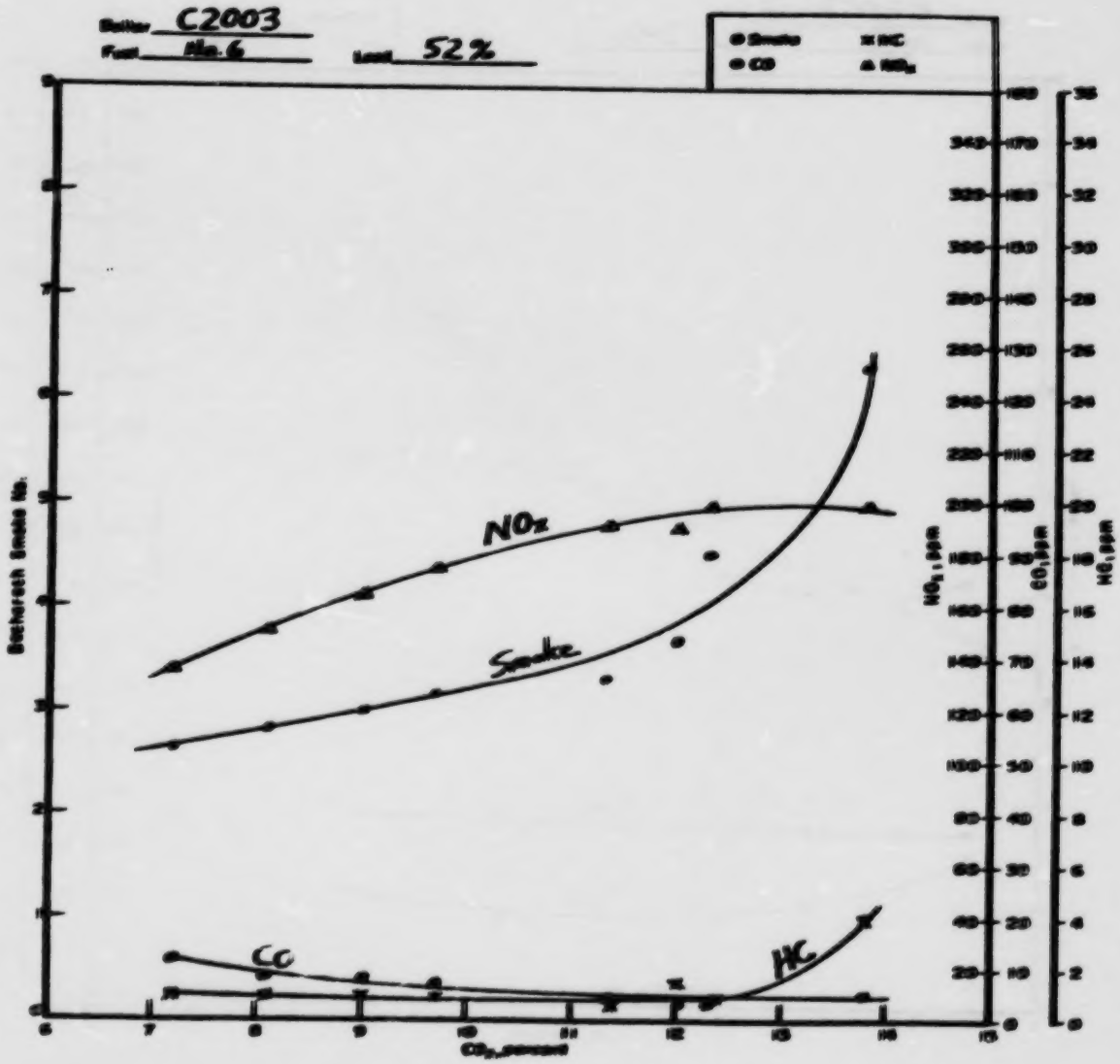
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/m³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
100.	830	208	3.7	11.5	5.2	370	11.	1.4	261.	266.	1440.	—	—
			3.7	11.8	4.8	380	10.	1.3	263.	268.	1160.	—	—
			4.2	12.0	3.2	374	8.	1.4	279.	282.	1260.	—	—
			4.5	13.4	2.8	365	11.	2.0	284.	273.	1310.	—	—
72.	655	208	3.8	9.2	8.7	359	13.	2.2	206.	211.	880.	—	—
			4.3	10.3	7.1	359	11.	2.2	233.	225.	900.	—	—
			4.3	11.0	6.2	350	10.	2.3	234.	238.	1060.	—	—
			4.2	11.9	5.0	355	9.	2.2	250.	250.	1150.	722.	744.
			4.2	12.5	4.2	350	10.	2.3	255.	260.	1160.	—	—
			5.7	13.3	3.2	340	10.	2.5	260.	260.	1350.	—	—
52.	43.0	206	2.6	7.2	11.2	332	12.	0.9	141.	136.	630.	—	—
			2.8	8.1	10.1	330	8.	0.9	160.	151.	720.	—	—
			3.0	9.0	9.1	330	7.	0.9	172.	165.	890.	—	—
			3.2	9.7	7.8	322	6.	0.9	190.	175.	870.	—	—
			3.3	11.3	5.8	315	4.	0.7	208.	191.	1030.	—	—
			3.7	12.0	5.0	310	3.	1.5	208.	190.	1040.	—	—
			4.5	12.3	4.6	315	3.	0.9	211.	193.	1120.	—	—
			6.3	12.8	2.7	340	5.	4.0	213.	199.	1260.	—	—
34.	28.0	199	4.1	6.7	12.0	340	29.	6.8	139.	145.	600.	—	—
			4.4	7.3	11.2	322	23.	6.8	151.	155.	650.	—	—
			4.0	8.2	9.7	311	20.	6.9	166.	171.	740.	—	—
			4.7	9.3	8.3	300	18.	7.1	182.	184.	860.	—	—
			5.7	10.9	6.1	295	16.	7.0	210.	215.	—	202.	304.
			4.8	11.2	5.3	292	17.	7.3	203.	204.	1090.	—	—
			3.5	12.5	4.0	285	22.	7.3	203.	211.	—	—	—



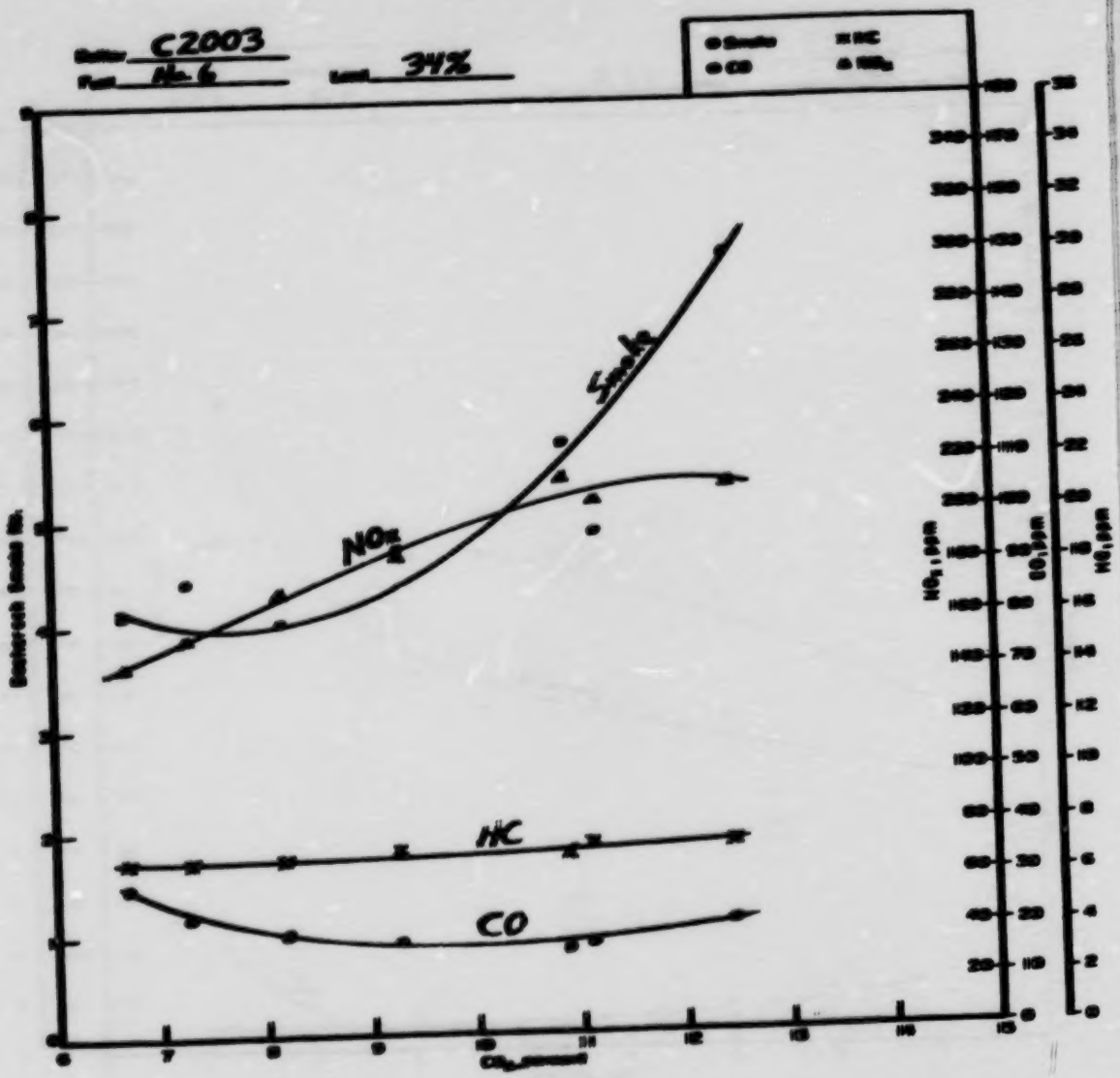
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

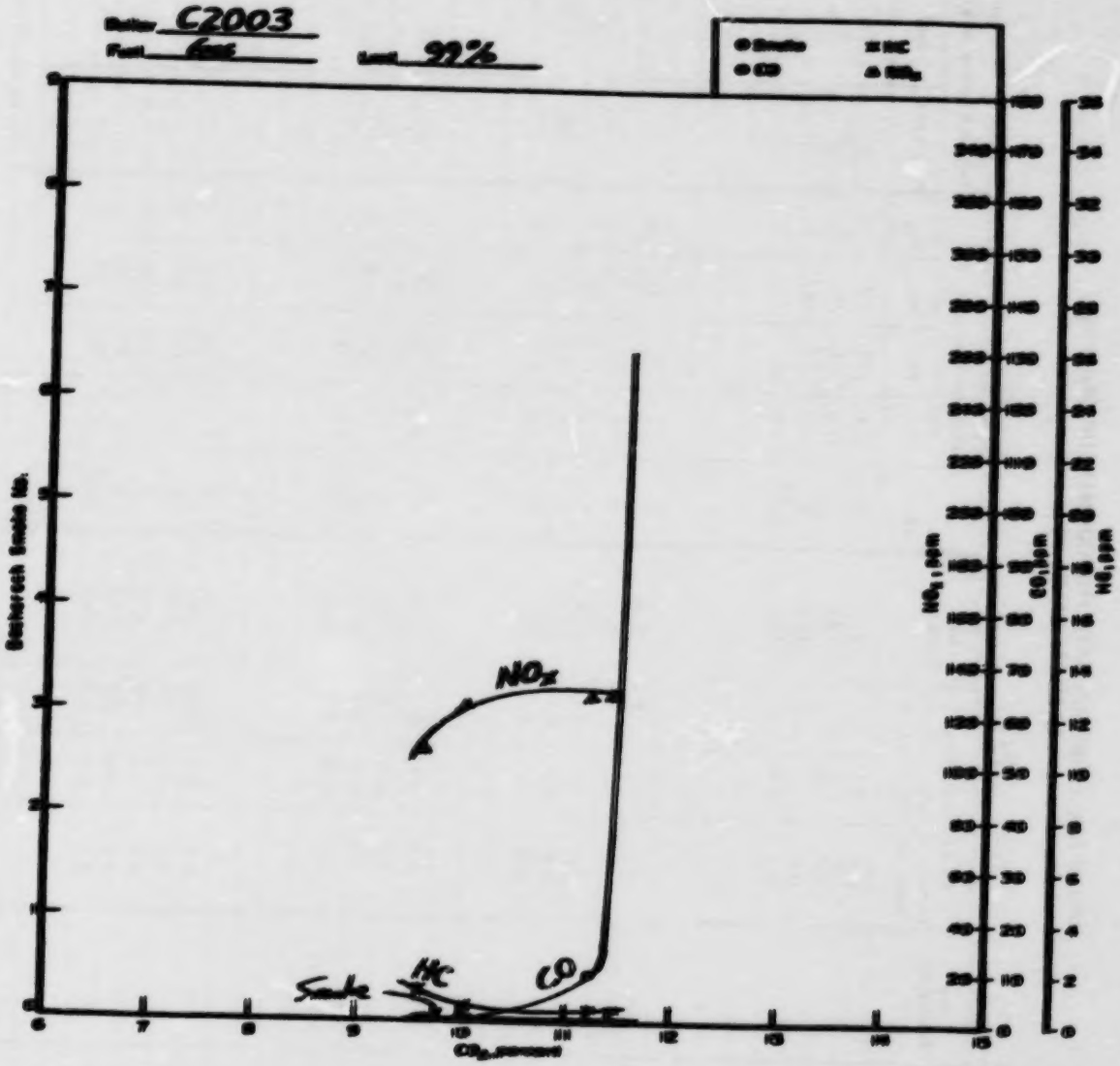


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

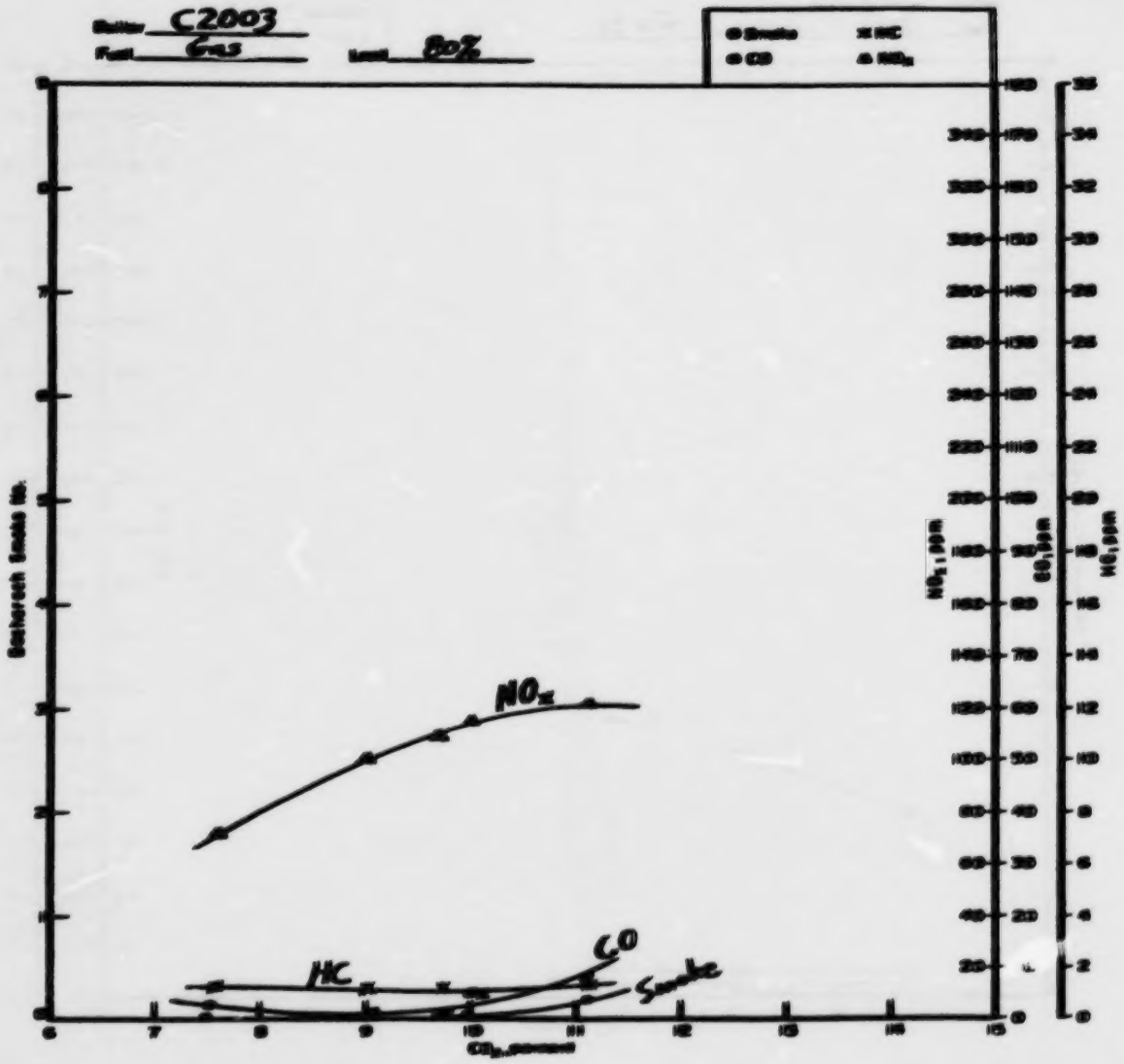
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2003 Fuel Gas

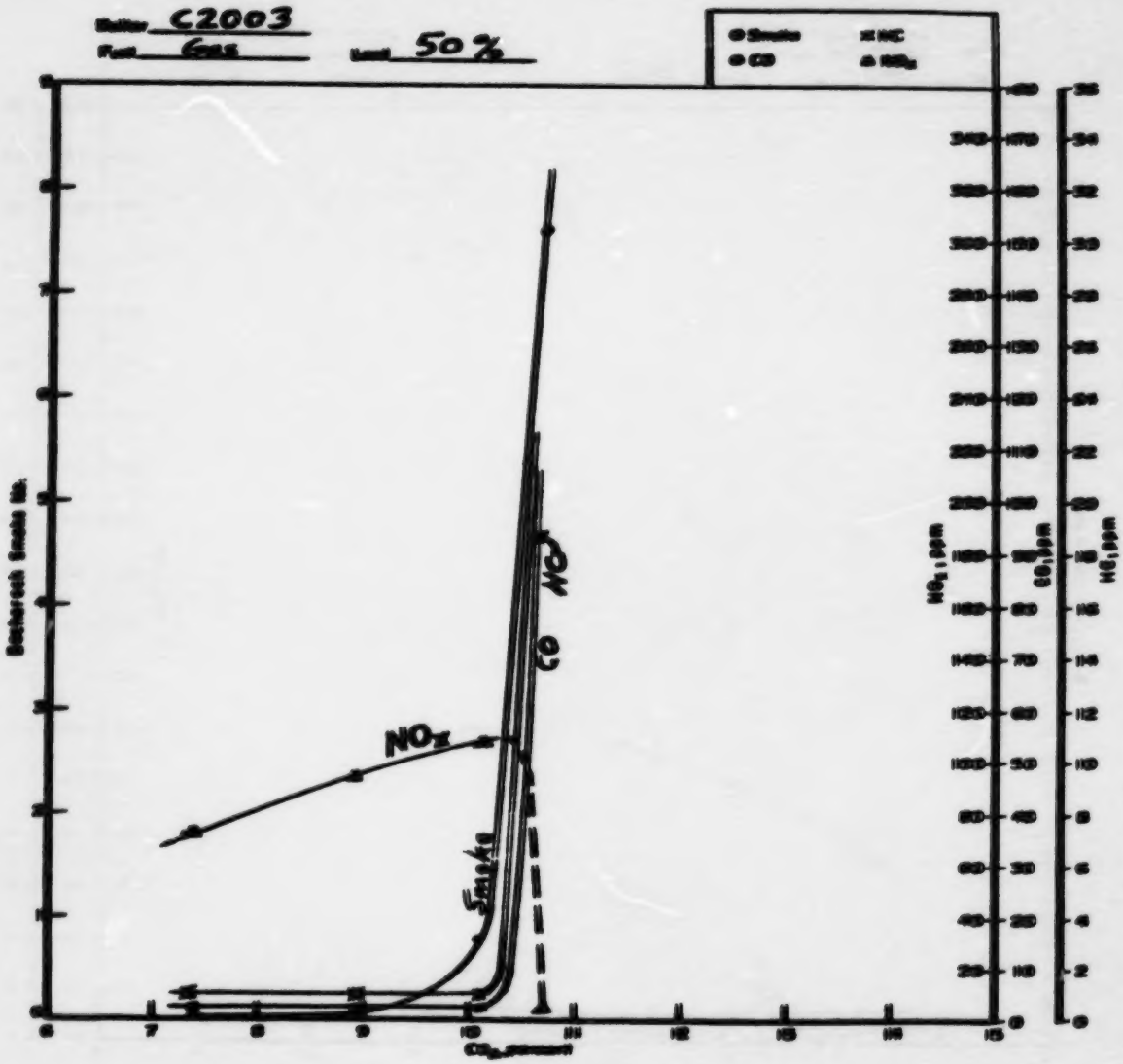
Load, percent	Firing Rate, cfh	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/m³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
103.	12,400.	-	0.0	9.6	4.0	390	1.	1.2	106.	106.	-	-	-
			0.0	10.0	2.3	385	1.	<1.0	116.	123.	0	-	-
			0.0	11.2	1.2	385	9.	<1.0	123.	123	-	-	-
			0.0	11.4	0.6	381	1025.	<1.0	123.	123	-	-	-
83.	10,000.	-	0.0	7.6	7.9	370	2.	1.2	69	71.	-	-	-
			0.0	9.0	5.1	360	1.	1.2	92	101.	-	-	-
			0.0	9.7	3.6	359	1.	1.2	109.	110.	-	-	-
			0.0	10.0	3.3	359	5.	1.0	113.	116.	0	4.0	14.7
			0.2	11.1	1.2	355	0.	1.2	116.	122.	-	-	-
52.	6280.	-	0.0	7.4	8.2	315	2.	1.0	74.	72.	-	-	-
			0.0	8.9	5.6	310	2.	1.0	95.	95.	-	-	-
			0.0	10.1	3.2	302	2.	1.0	104.	106.	0	-	-
			2.5	10.7	0.4	291	>1240.	250.	84.	5.	-	-	-
35.	4250.	-	0.0	6.5	10.2	281	5.	<1.0	64.	65.	-	-	-
			0.0	8.3	6.6	269	8.	<1.0	86.	86.	-	-	-
			0.0	9.2	4.9	267	7.	<1.0	91.	92.	-	-	-
			0.0	10.0	3.3	263	7.	<1.0	94.	94.	0	-	-
			5.0	11.4	0.7	260	305.	4.0	84.	89.	-	-	-



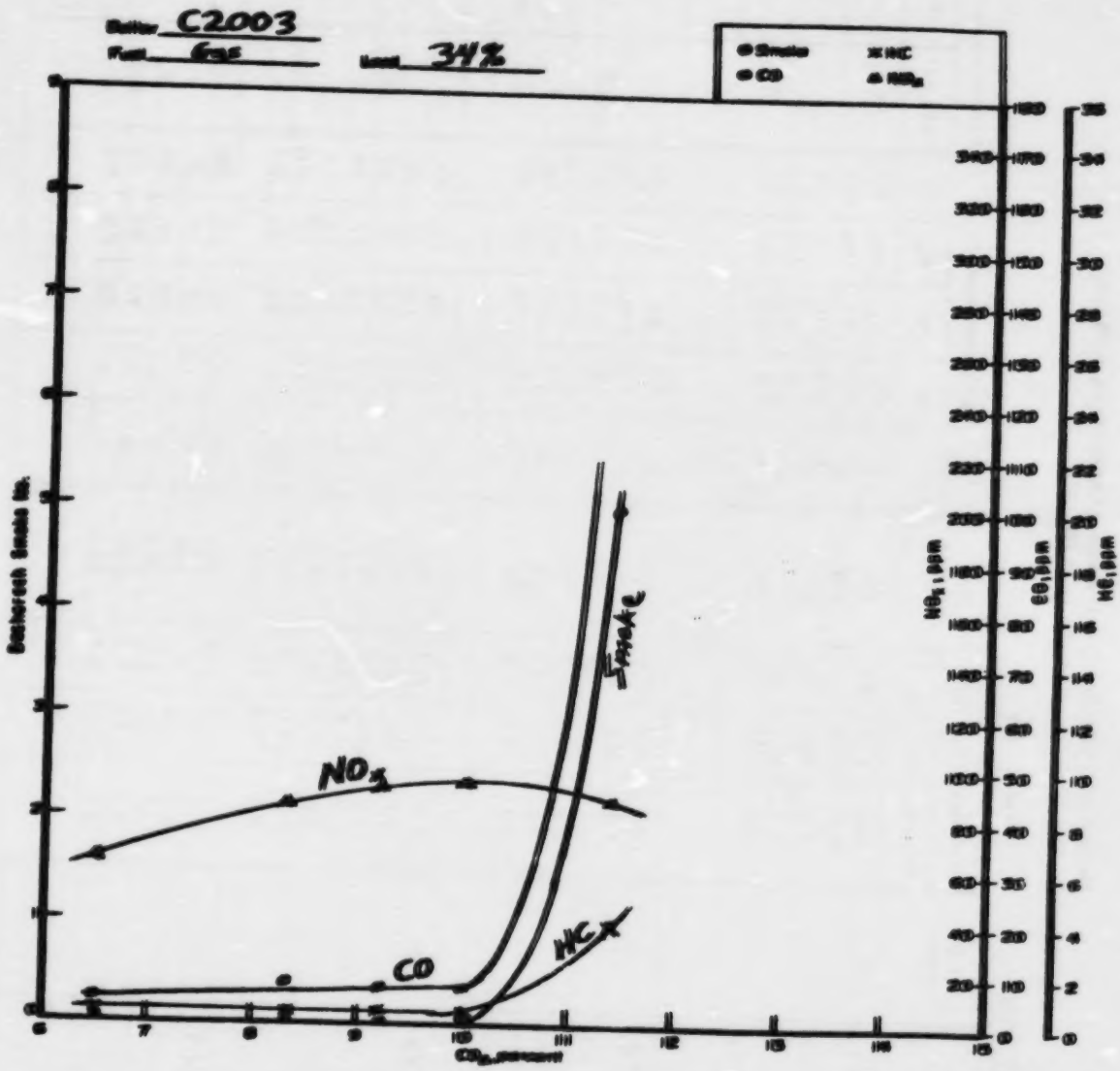
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

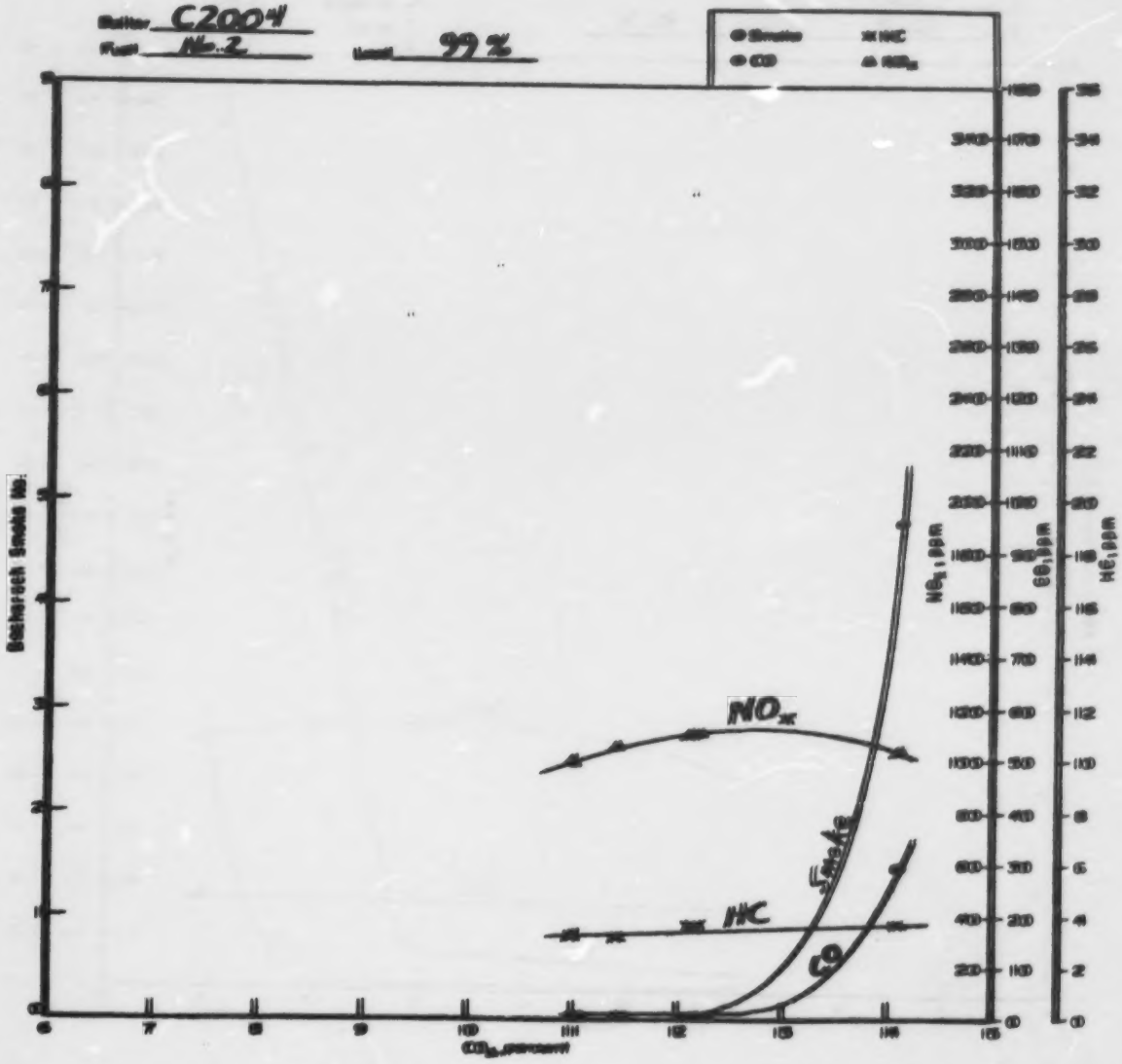


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

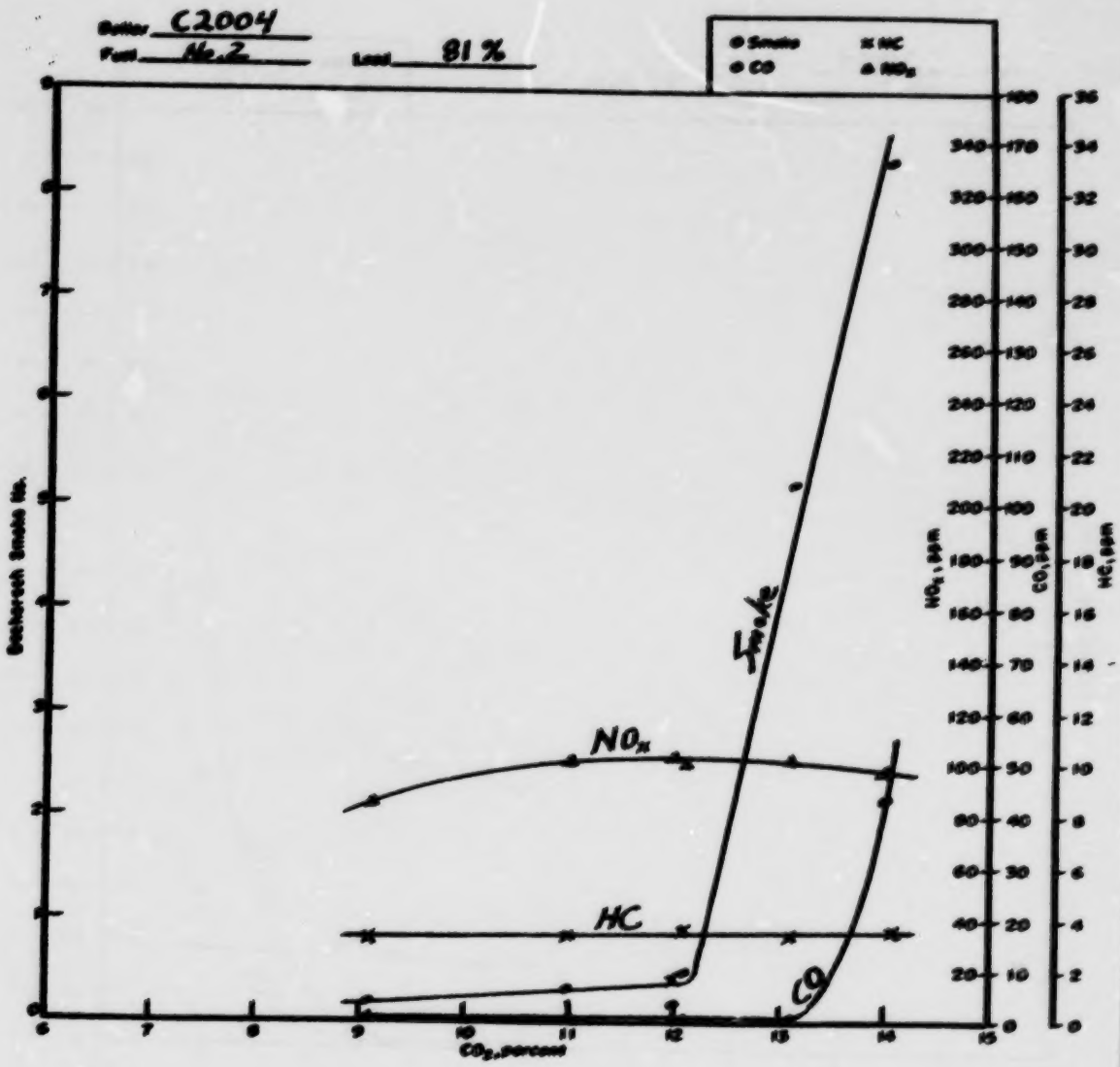
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C 2004 Fuel No. 2

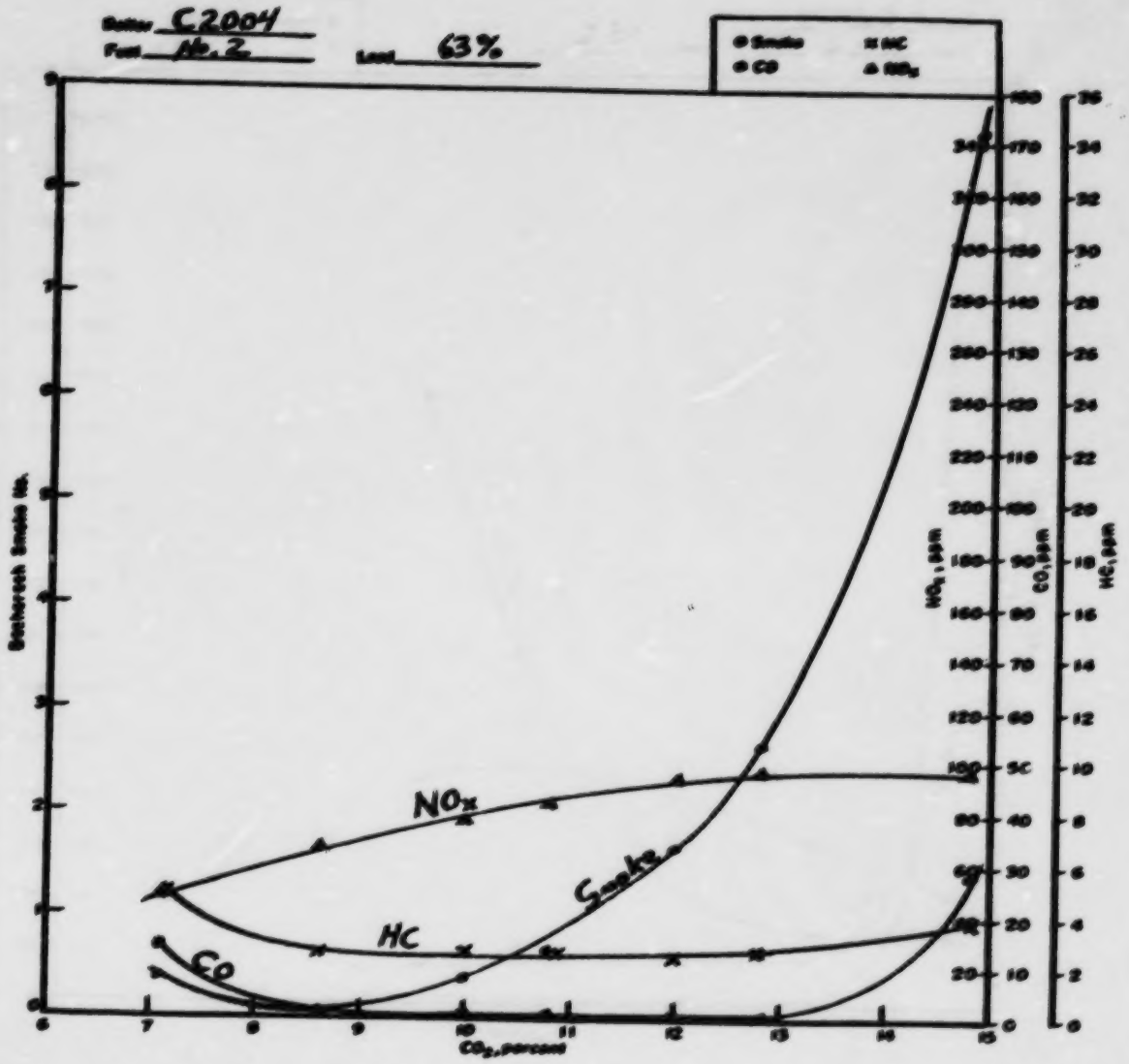
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions: Smoke No.	Combustion Conditions: CO_2, %	Combustion Conditions: O_2, %	Stack Temperature, F	Gaseous Emissions, ppm: CO	Gaseous Emissions, ppm: HC	Gaseous Emissions, ppm: NO	Gaseous Emissions, ppm: NO_x	Gaseous Emissions, ppm: SO_2	Particulate Loading, mg/m³: Probe + filter	Particulate Loading, mg/m³: Total
99	23.4	=	0.0	11.0	3.5	510	0	3.2	98	100	97	=	=
			0.0	11.4	6.5	504	0	3.2	104	106	102	=	=
			0.0	12.1	4.2	500	0	3.0	110	111	104	=	=
			0.0	12.2	4.0	500	0	3.0	109	112	107	=	=
			4.0	14.1	2.1	471	30	3.0	104	105	126	=	=
81	19.2	=	0.2	9.1	8.6	479	0	3.2	86	86	79	=	=
			0.3	11.0	6.1	441	0	3.3	100	101	96	=	=
			0.2	12.0	4.5	428	0	1.0	103	104	102	9.3	16.6
			0.5	12.1	4.3	428	0	3.7	100	101	107	=	=
			5.2	13.1	3.0	412	0	3.5	102	103	116	=	=
			0.3	14.0	1.9	402	44	3.6	99	99	124	=	=
63	14.8	=	0.4	7.1	11.3	418	14	5.0	46	48	56	=	=
			0.1	8.6	9.1	402	0	2.6	68	68	72	=	=
			0.4	10.0	7.1	388	0	2.7	78	78	84	=	=
			0.7	10.8	6.1	379	0	2.7	84	85	92	=	=
			1.7	12.0	4.5	365	0	2.5	94	94	102	=	=
			2.7	12.8	3.7	355	0	2.8	97	97	108	=	=
			8.6	14.8	1.2	330	20	4.0	98	99	128	=	=
46	10.9	=	0.7	6.5	11.7	386	125	10.0	44	43	50	=	=
			0.7	7.9	10.1	365	0	1.8	64	64	71	=	=
			1.1	8.0	8.7	359	0	1.7	74	74	80	=	=
			3.4	10.6	6.3	332	0	2.3	95	94	95	6.5	25.2
			5.9	11.5	5.1	322	0	1.5	88	88	102	=	=



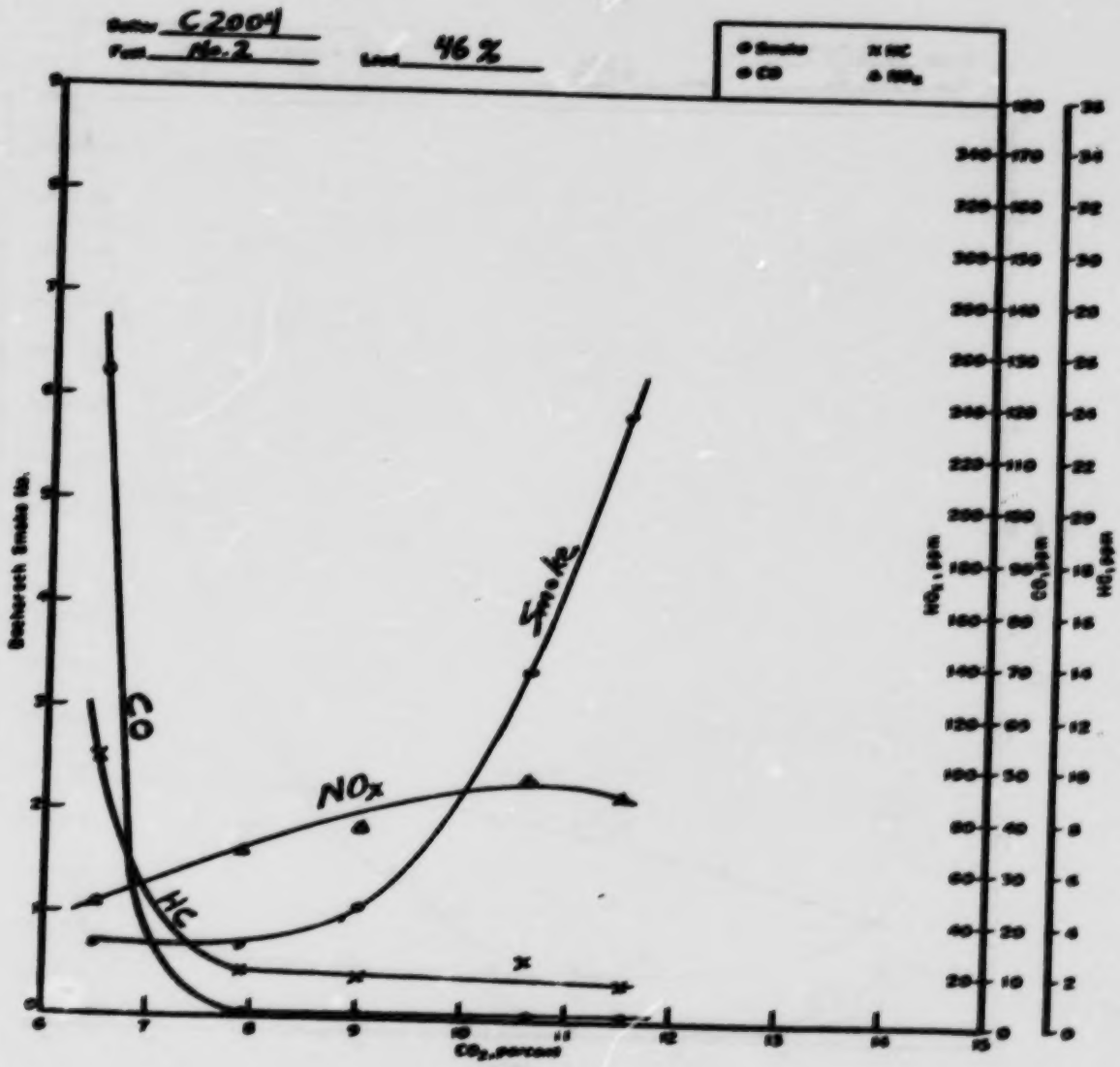
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

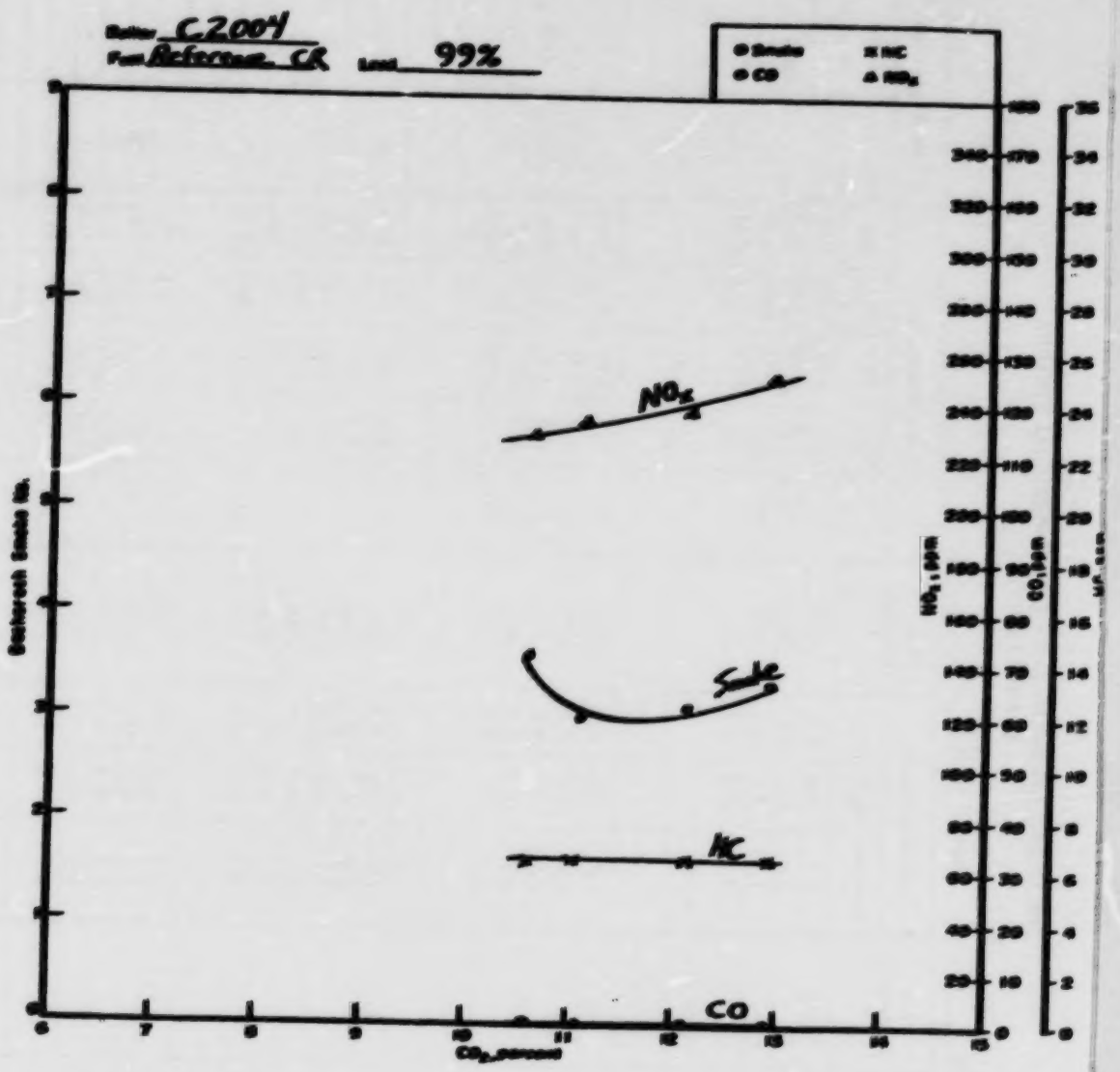


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

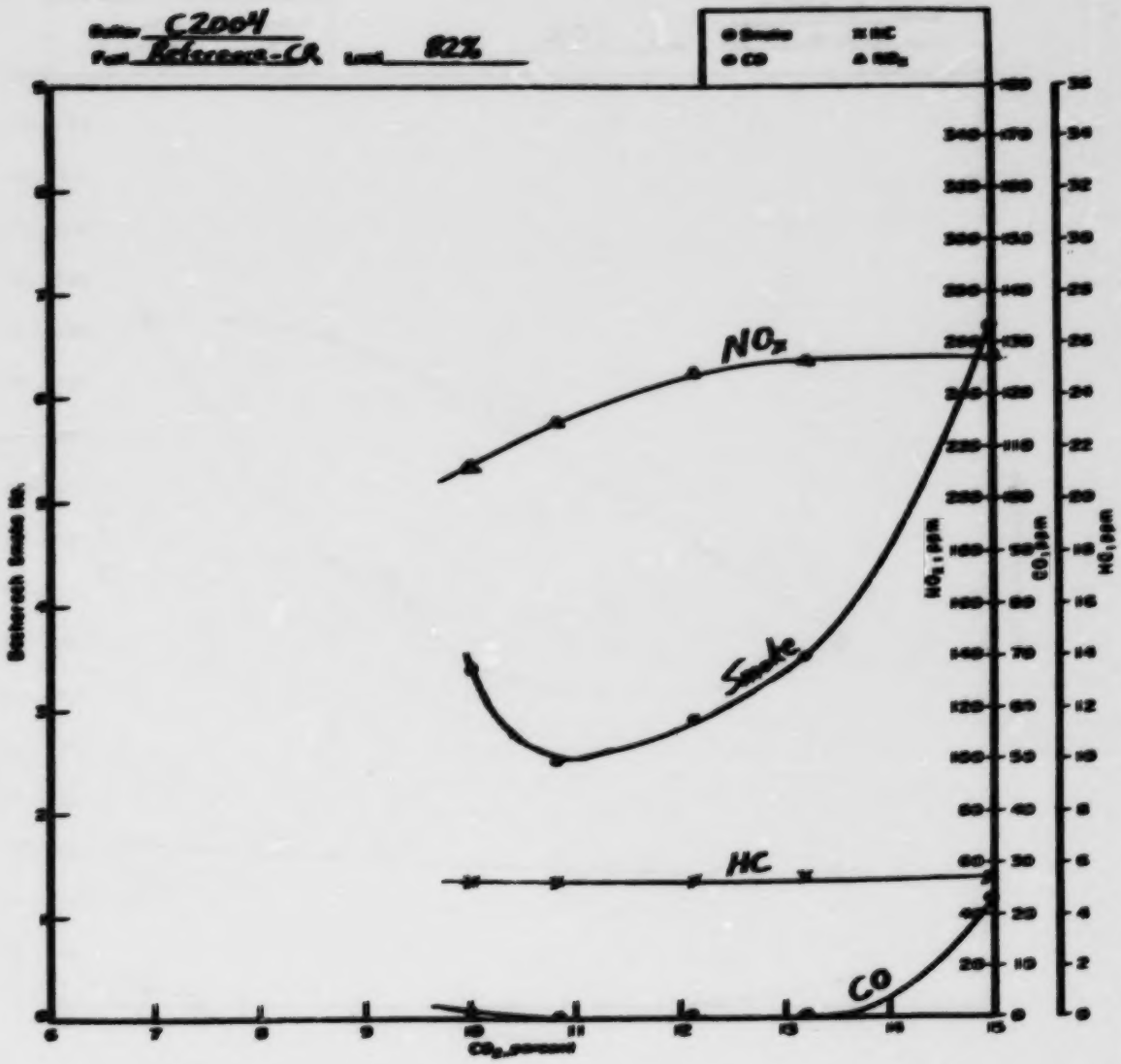
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2004 Fuel CR

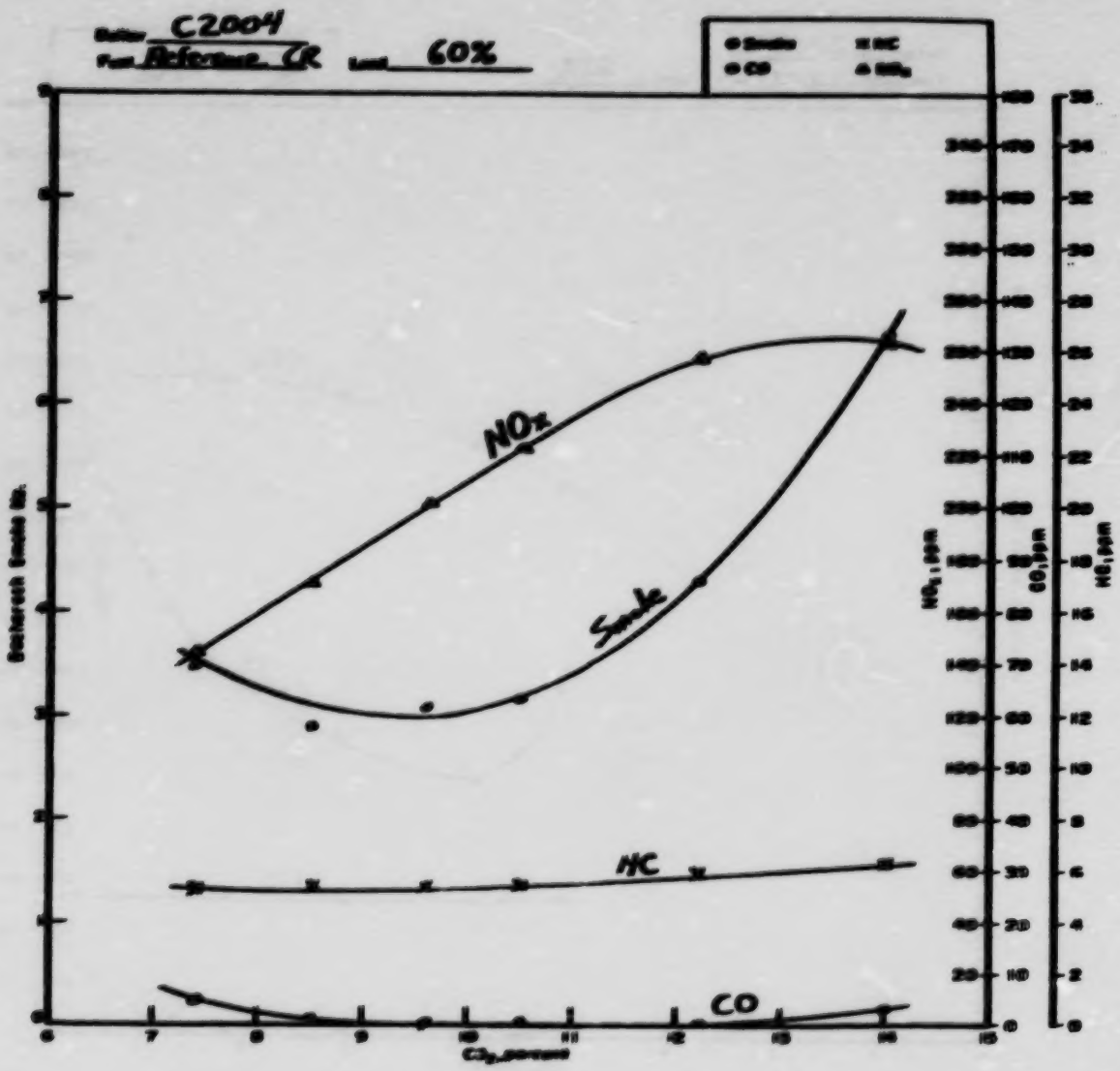
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/m³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
100.	22.3	116	3.6	10.6	6.0	484	0	6.2	232.	239.	420.	—	—
			3.0	11.1	5.5	470	0	6.3	232.	234.	455.	—	—
			3.1	12.1	4.2	459	0	6.3	236.	236.	490.	—	—
			3.3	12.9	3.3	451	0	6.3	256.	251.	520.	—	—
82.	18.3	—	3.4	10.0	6.7	449	1.	5.3	212.	212.	400.	—	—
			2.5	10.8	5.7	440	0	5.3	230.	230.	430.	—	—
			2.9	12.1	4.2	435	0	5.3	251.	242.	500.	67.6	104.
			3.5	13.3	2.9	412	0	5.5	247	252	520.	—	—
			6.7	15.0	0.8	395	47.	5.5	242.	256.	610.	—	—
60.	13.4	119	3.5	7.4	9.5	428	5.	5.2	146.	145.	290.	—	—
			2.9	8.5	8.2	409	1.	5.3	171.	171.	310.	—	—
			3.1	9.6	6.8	398	0	5.3	201.	201.	380.	—	—
			3.3	10.5	6.0	383	0	5.5	220.	223.	410.	—	—
			4.3	12.3	4.1	360	0	6.0	254	252.	480.	—	—
			6.7	14.0	1.7	340	2.	6.3	260.	262.	560.	—	—
48.	10.7	119	4.3	4.7	15.4	382	50.	5.5	102.	105.	150.	—	—
			3.6	6.5	12.5	368	1.	4.1	165.	165.	260.	—	—
			3.4	8.0	10.0	350	0	4.3	201.	205.	320.	—	—
			4.5	10.0	7.2	330	0	4.5	241.	245.	400.	—	—
			6.4	11.9	4.4	318	2.	5.0	260.	260.	500.	—	—



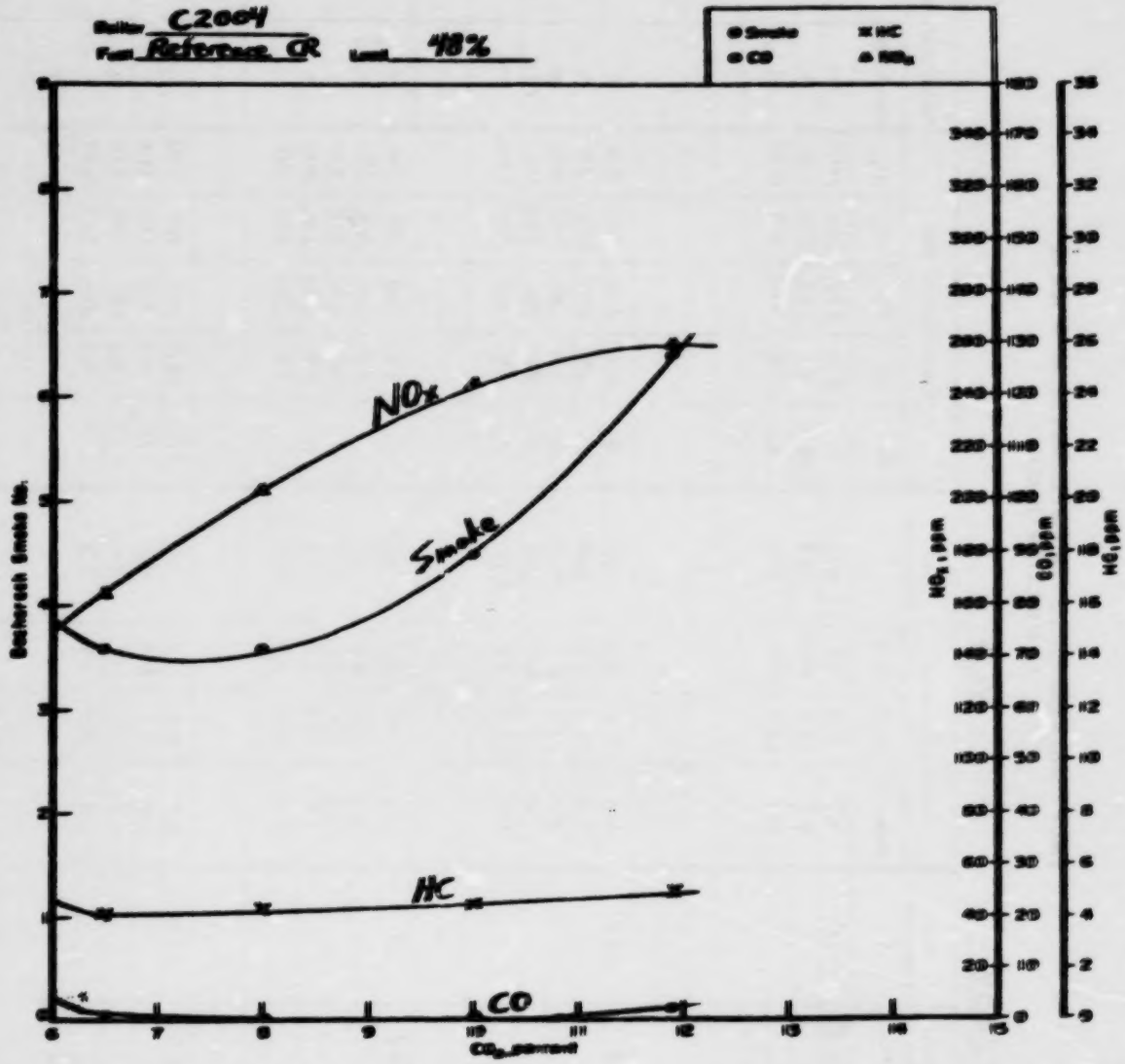
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

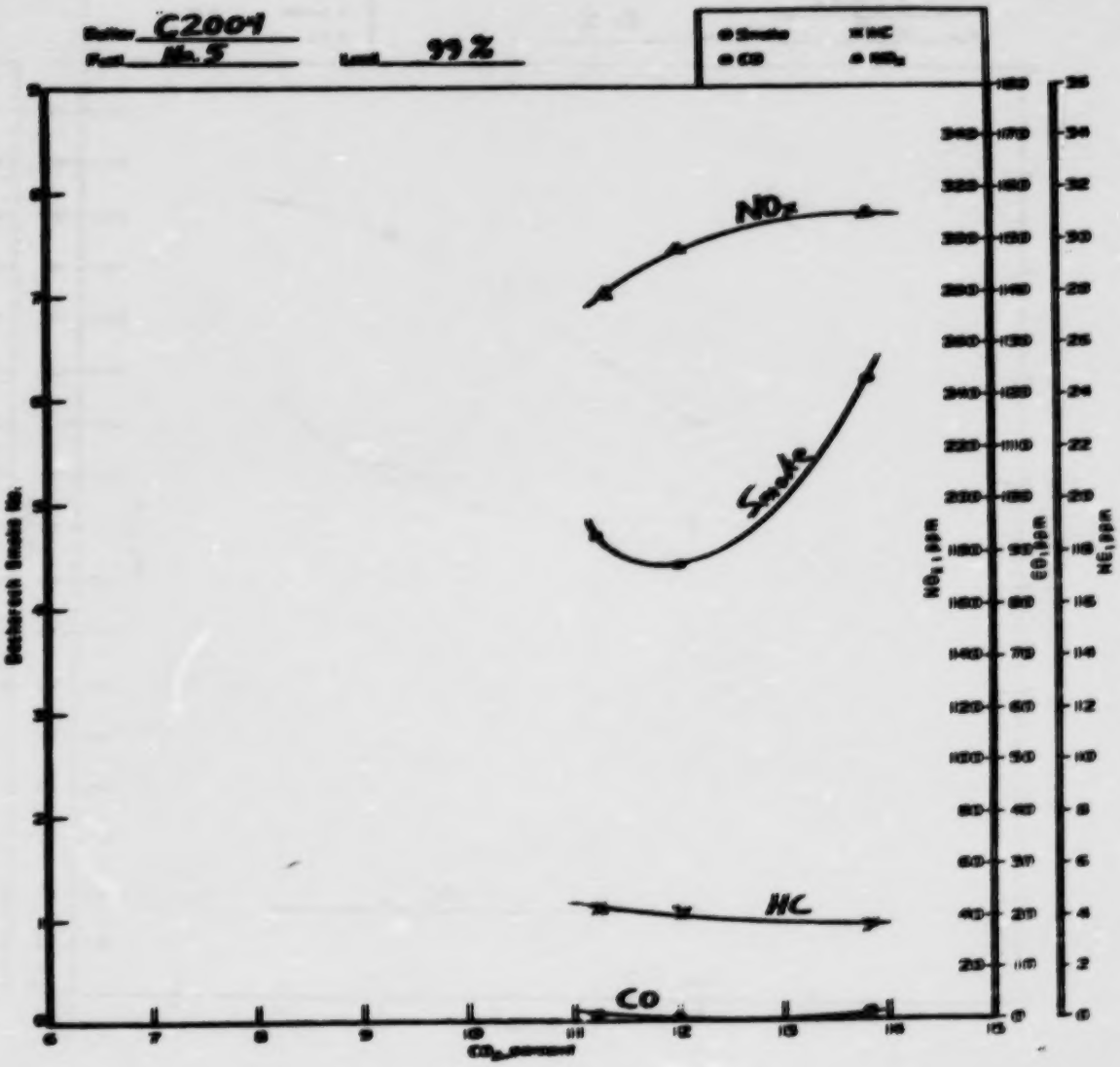


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

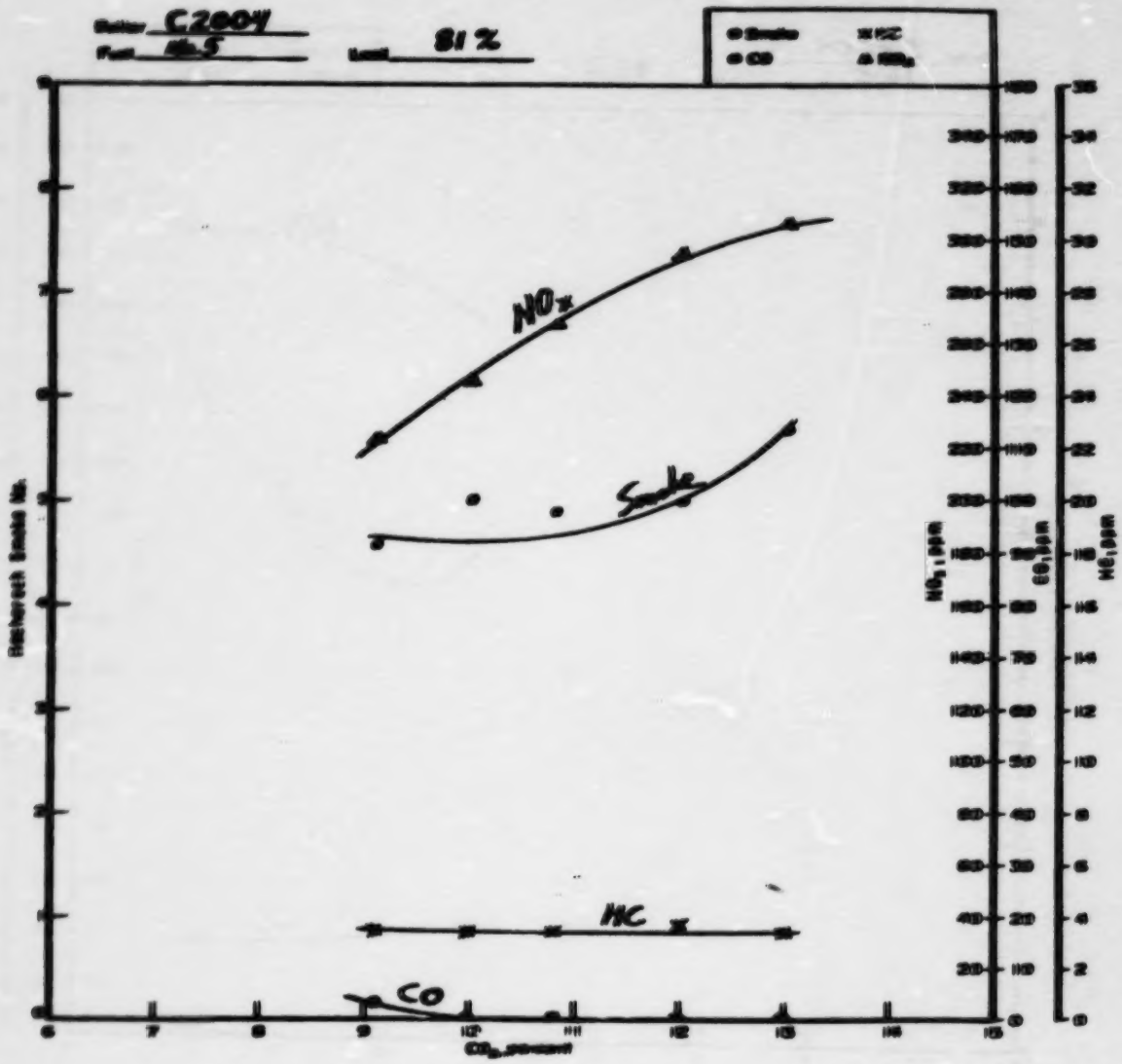
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2004 Fuel No. 5

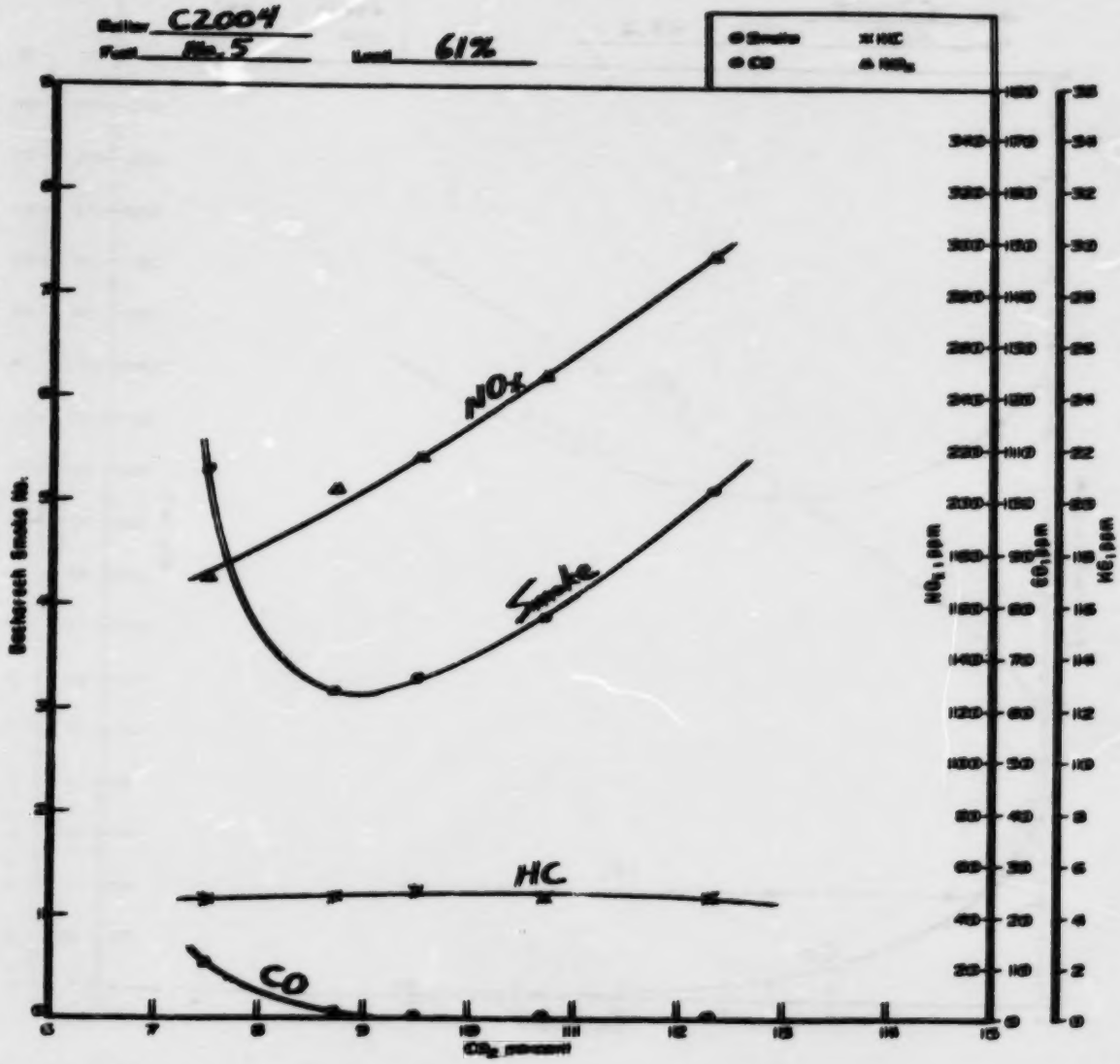
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/m³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + Filter	Total
104.	22.5	118	4.7	11.2	5.5	473	1.	4.2	278.	280.	1110.	—	—
			4.4	12.0	4.5	463	0	4.1	293.	298.	1180.	—	—
			6.2	13.8	2.3	446	1.	3.8	302.	310.	1250.	—	—
85.	18.4	120	4.6	9.1	8.6	455	2.	3.5	219.	222.	870.	—	—
			5.0	10.0	7.3	435	0	3.4	244.	246.	970.	—	—
			4.9	10.8	6.2	428	0	3.3	261.	268.	1050.	—	—
			5.0	12.0	4.8	418	0	3.7	291.	295.	1160.	134	202.
			5.7	13.6	3.4	400	0	3.3	308.	302.	1230.	—	—
64.	13.8	120	5.3	7.5	10.5	427	11.	4.8	168.	174.	710.	—	—
			3.2	8.7	8.6	414	1.	4.0	206.	205.	850.	—	—
			3.3	9.5	7.6	405	0	5.0	226.	217.	930.	—	—
			3.9	10.7	6.3	395	0	4.0	250.	248.	1050.	—	—
			5.1	12.3	4.3	380	0	4.0	290.	295.	1240.	—	—
50.	10.8	120	6.5	5.9	13.1	328	302.	12.0	104.	109.	540.	—	—
			5.4	6.9	11.6	365	16.	4.2	142.	154.	660.	—	—
			4.9	8.6	9.1	349	3.	4.2	194.	193.	850.	—	—
			6.0	12.0	4.6	319	2.	4.2	281.	284.	1260.	—	—



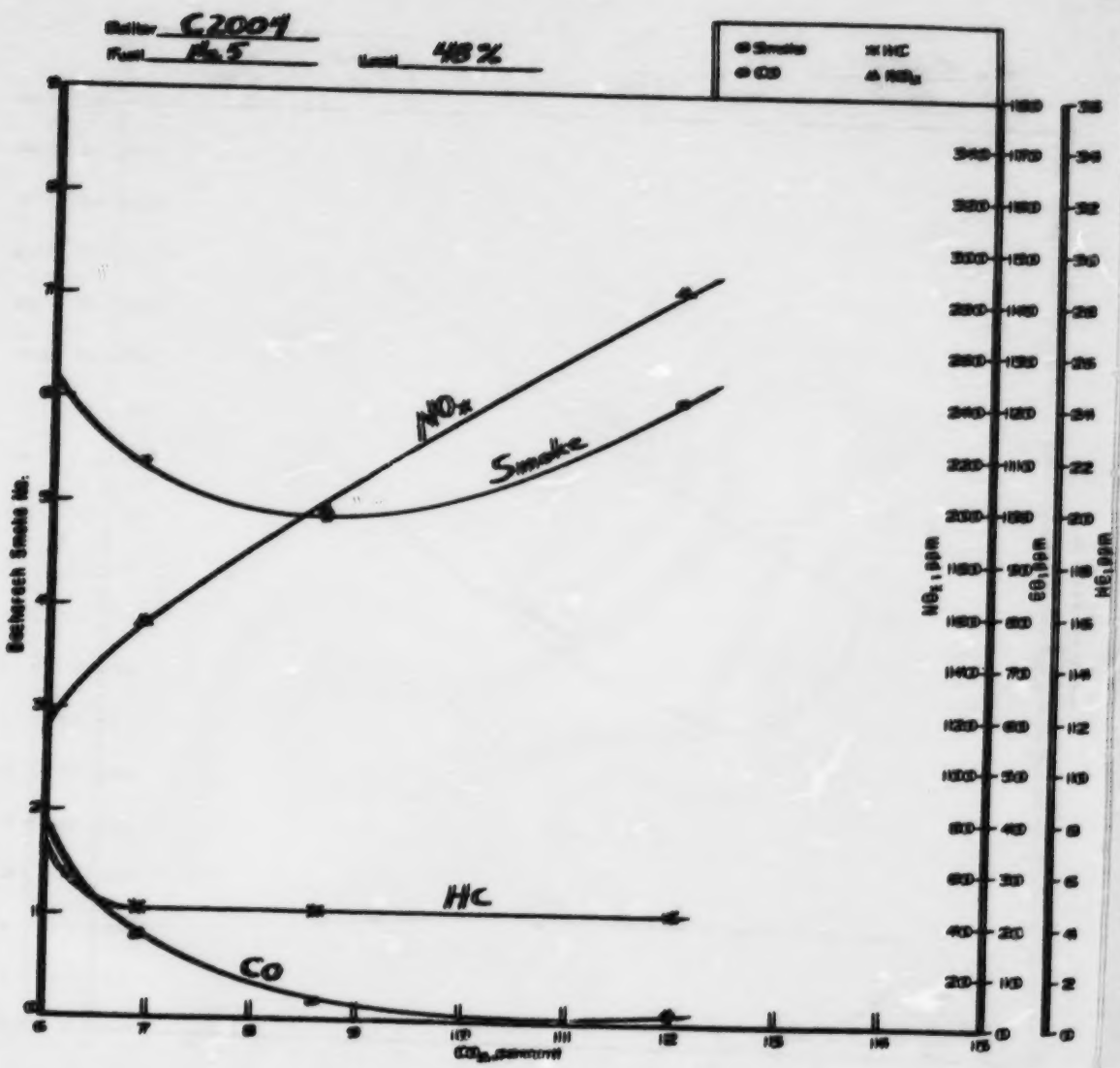
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

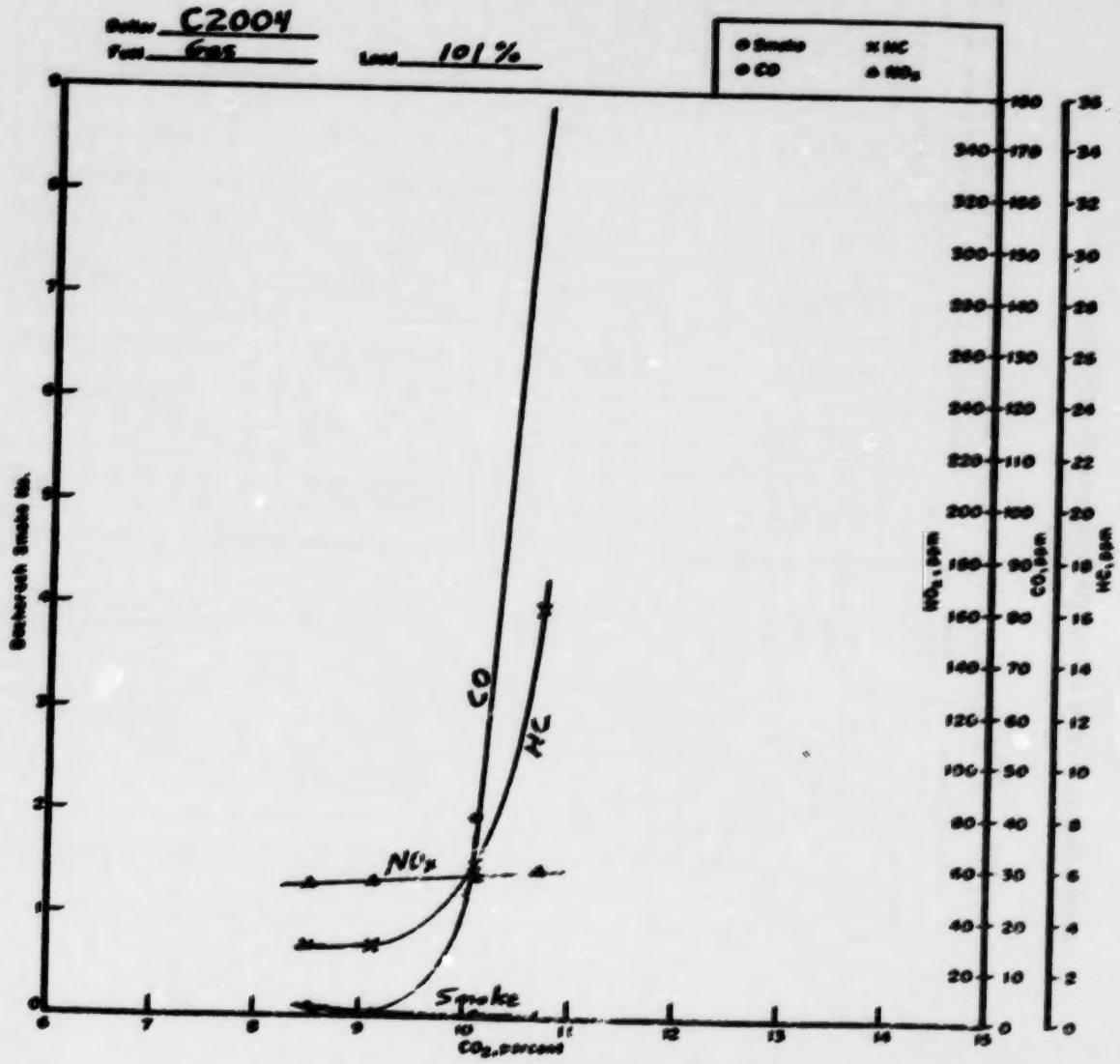


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

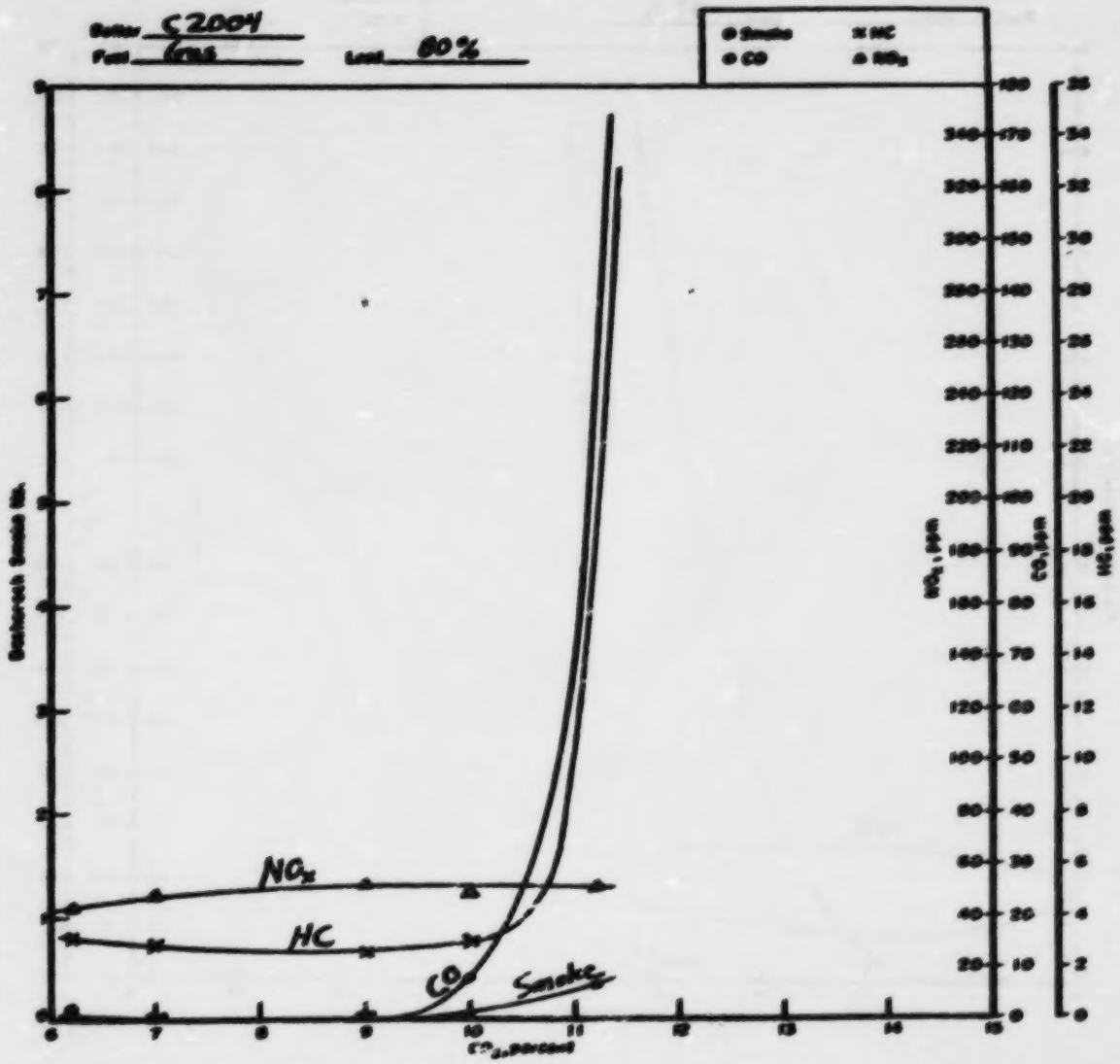
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2004 Fuel Gas

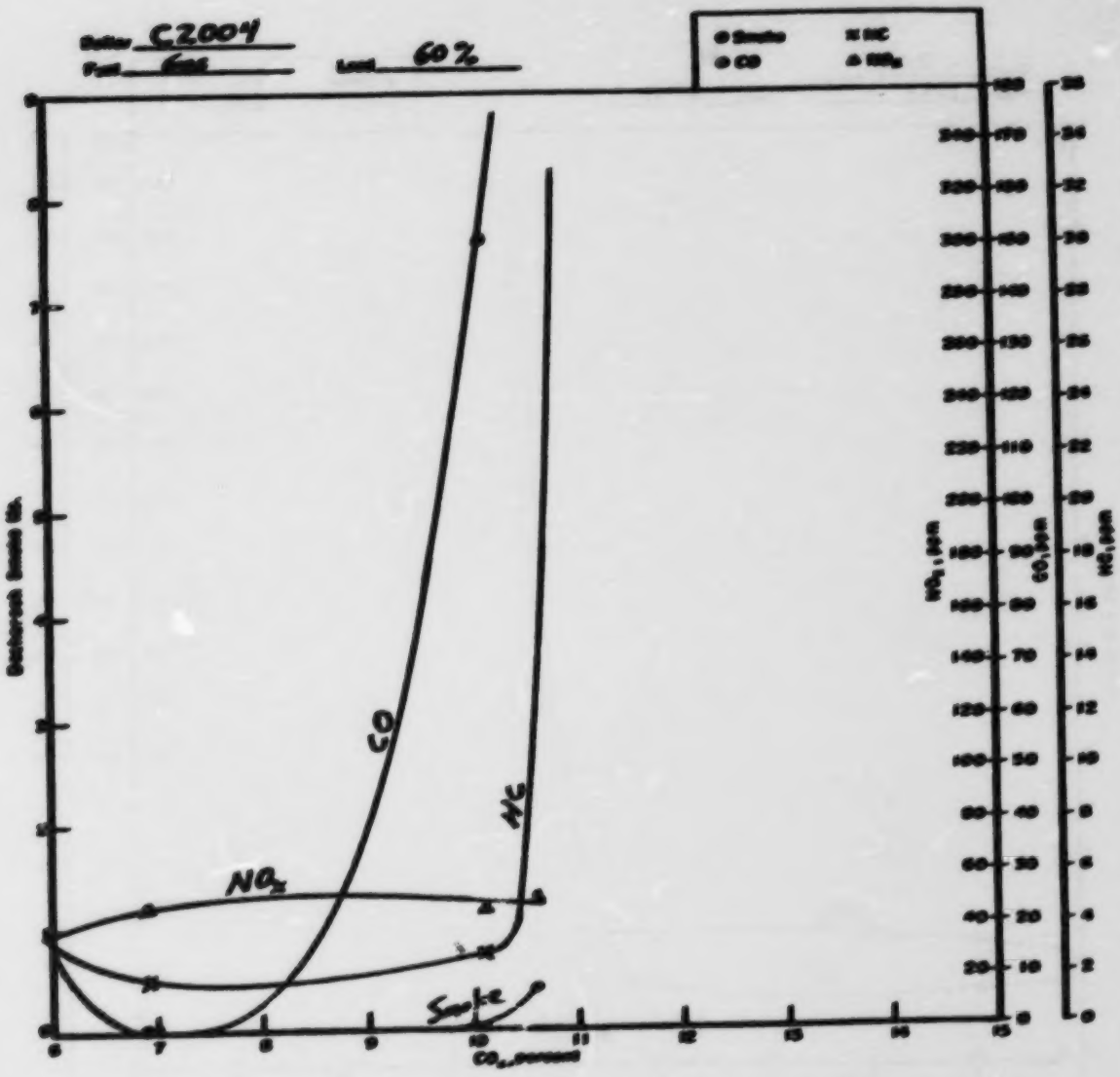
Load, percent	Firing Rate, cfh	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/cm³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
96.	3030.	-	0.1	8.5	6.5	414	0	2.8	50.	52.	0	-	-
			0.0	9.1	5.8	415	0	2.8	51.	53.	0	-	-
			0.3	10.1	3.3	415	30.	6.0	54.	56.	0	-	-
			0.0	10.7	2.3	415	206.	16.0	54.	59	0	-	-
76.	2400.	-	0.0	6.2	11.8	422	2.	3.1	41.	43.	0	-	-
			0.0	7.0	9.2	422	0	2.9	42.	49.	0	-	-
			0.0	9.0	5.6	408	0	2.7	50.	52.	0	-	-
			0.0	10.0	3.6	405	8.	3.6	47.	50.	0	2.2	6.2
			0.3	11.2	0.9	402	>1240.	650.	45.	51.	25.	-	-
57	1800.	-	0.0	4.7	12.8	380	730.	70.	5.	24.	0	-	-
			0.0	5.4	11.2	381	42.	1.8	26.	31.	0	-	-
			0.0	6.9	8.4	365	0	2.0	48.	48.	0	-	-
			0.0	10.1	3.2	351	152.	30.	44.	47.	0	-	-
			0.4	10.6	2.1	345	1006.	200.	48.	51.	18.	-	-
35.	1100.	-	0.0	2.8	16.2	311	>1240.	3200.	3.	12.	0	-	-
			0.0	3.5	14.8	322	1100.	1050.	2.	15.	0	-	-
			0.0	4.6	13.1	318	333.	130.	3.	16.	0	-	-
			0.0	5.7	11.0	310	82.	45.	18.	31.	0	-	-
			0.0	7.8	7.4	290	0	1.7	51.	52.	0	-	-
			0.0	9.1	5.1	280	7.	1.8	48.	48.	0	-	-
			0.1	9.8	3.8	272	40.	4.0	46.	48.	0	-	-
			2.7	11.2	1.2	269	>1240.	370.	38.	46.	10.	-	-



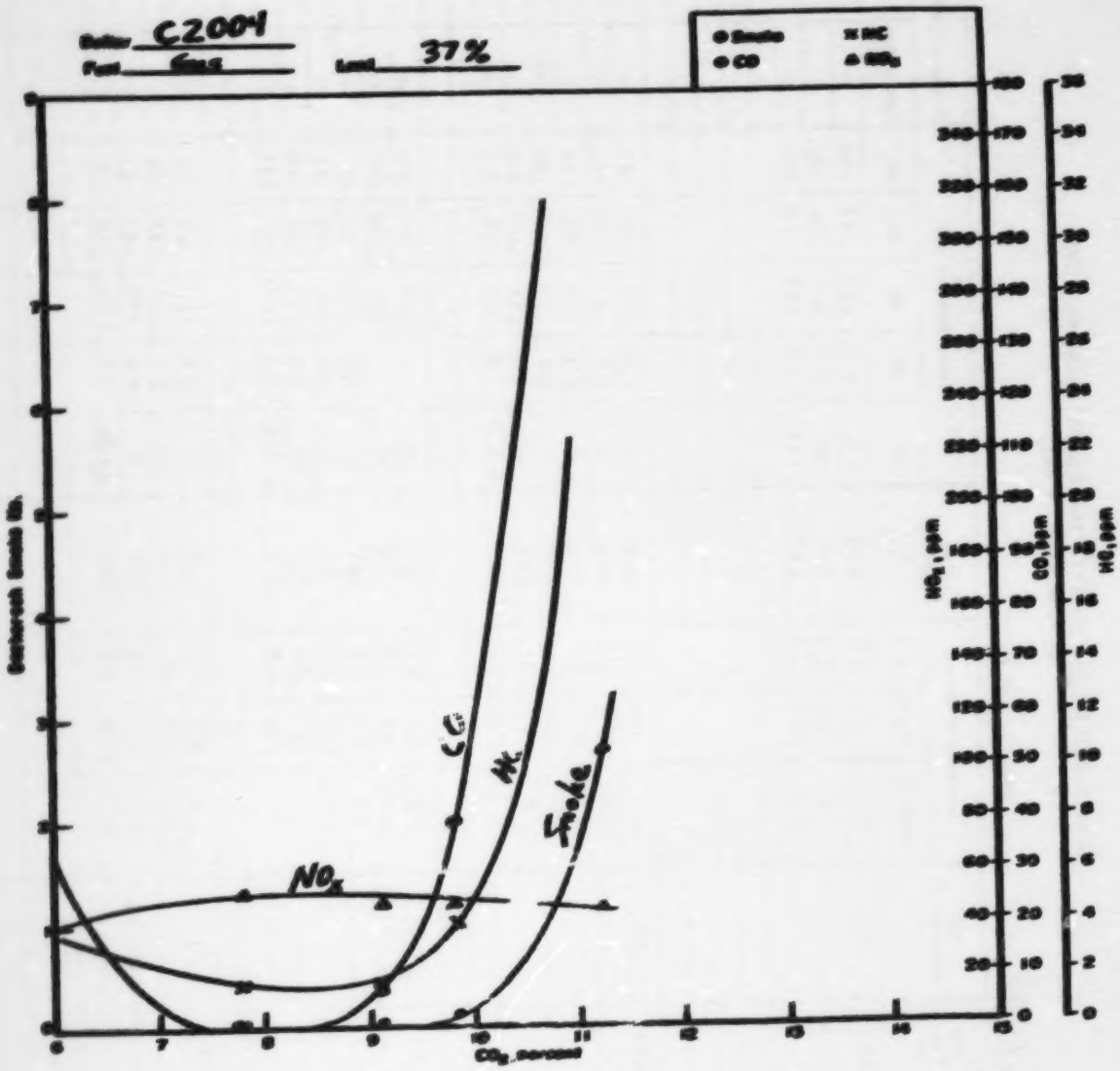
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

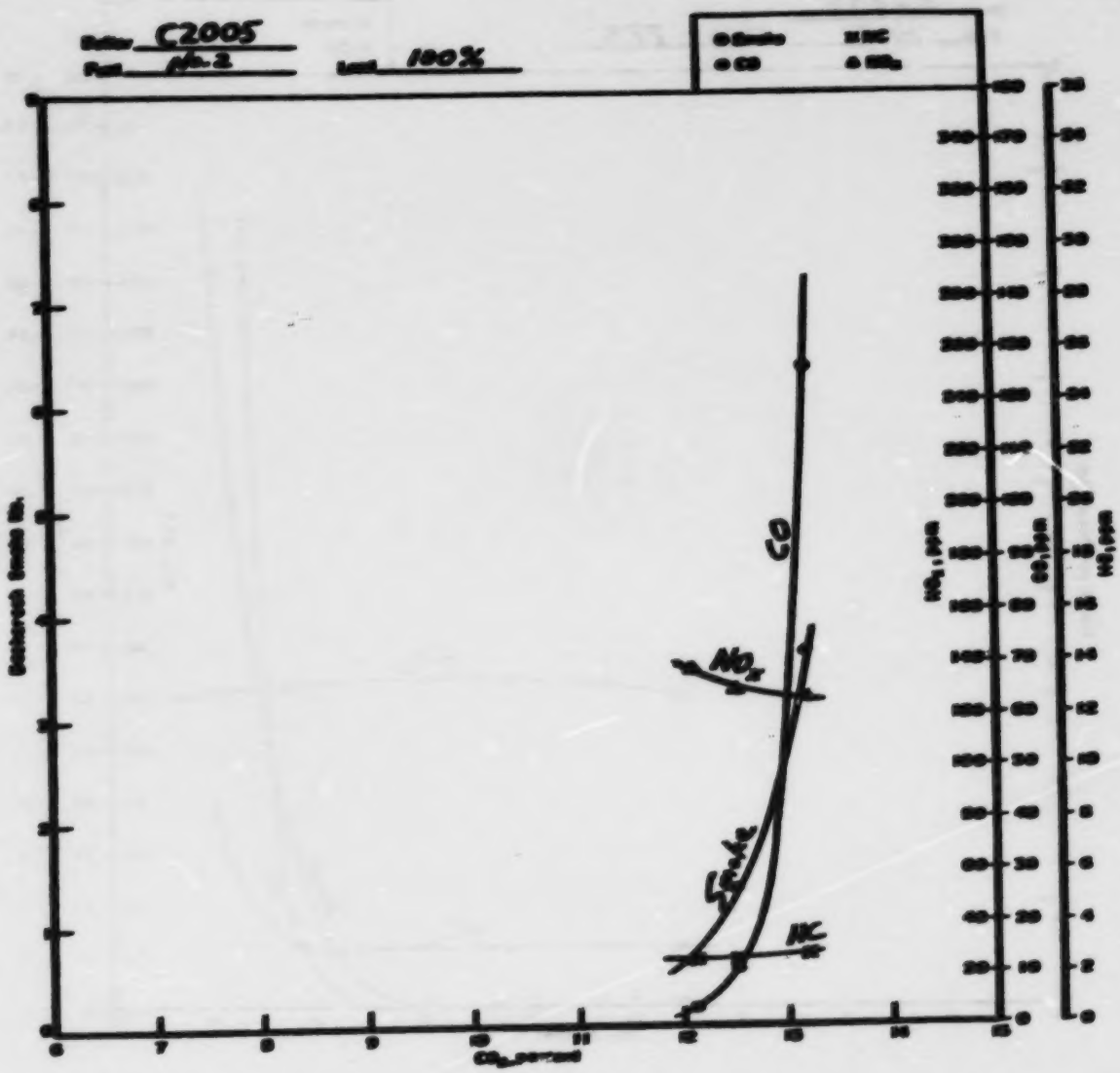


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

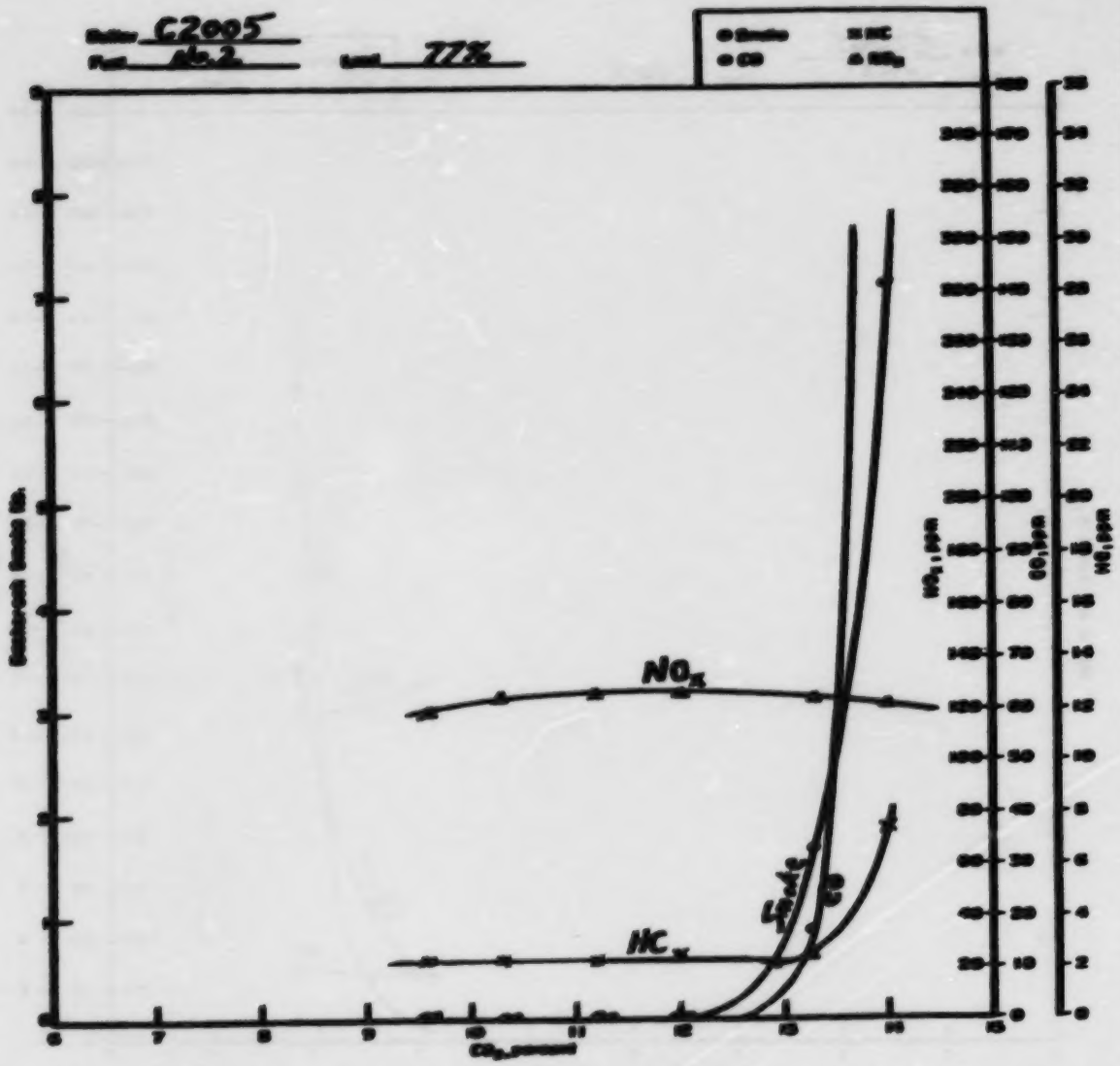
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2005 Fuel No. 2

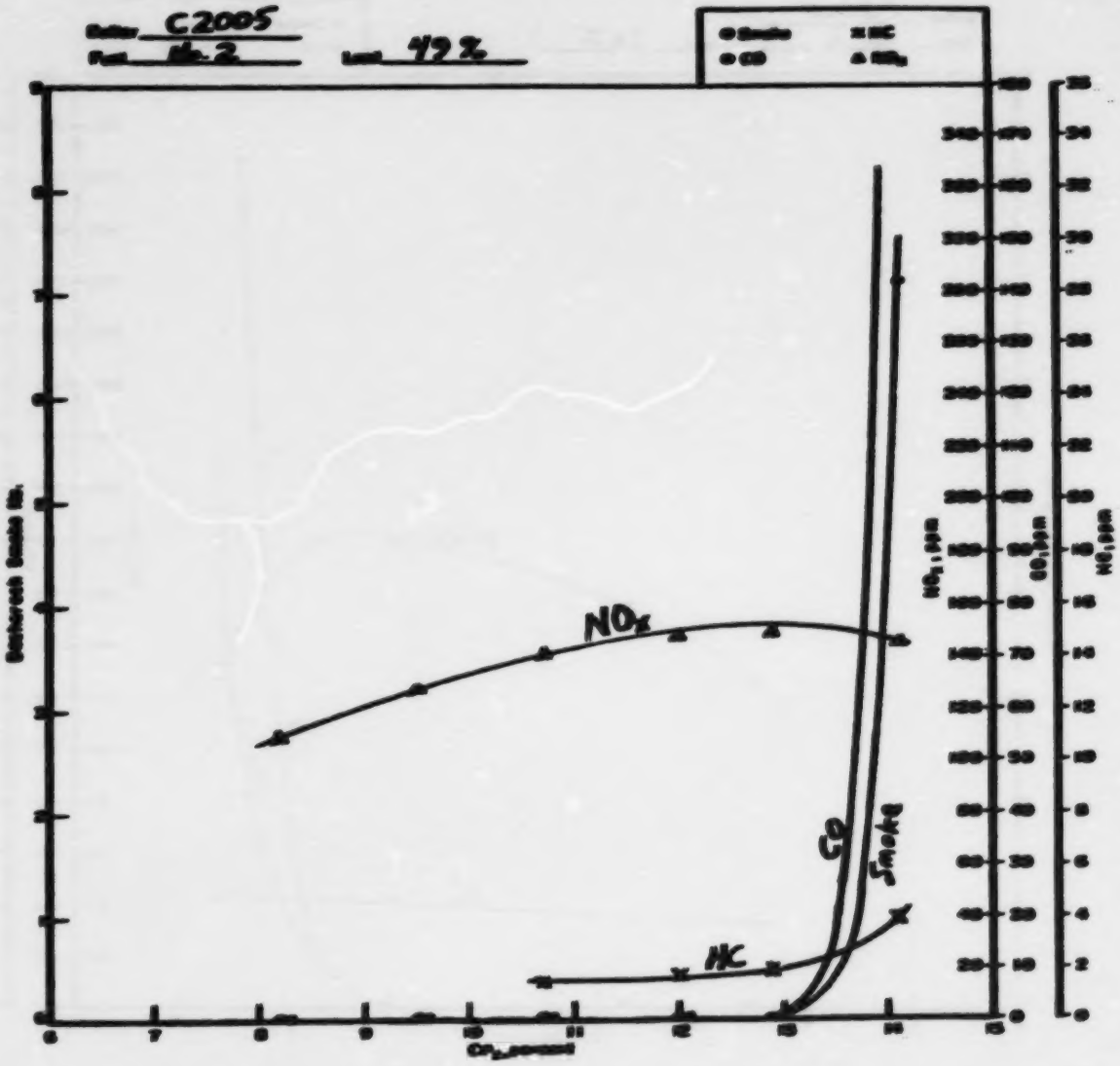
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/cm³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
99.	30.6	83	0.6	12.1	4.3	333	3.	2.5	132.	136.	190.	—	—
			1.3	12.5	3.7	330	11.	2.5	128.	130.	195.	—	—
			3.6	13.3	2.7	328	122.	2.8	123.	127.	205.	—	—
74.	23.6	85	0.0	9.6	7.5	308	0	2.3	118.	120.	143.	—	—
			0.0	10.3	6.7	305	0	2.3	123.	125.	155.	—	—
			0.0	11.3	5.4	304	0	2.3	124.	126.	169.	—	—
			0.0	12.0	4.3	300	0	2.6	125.	127.	186.	5.4	32.5
			1.7	13.3	2.6	294	18.	2.5	122.	125.	200.	—	—
			3.1	14.0	1.3	289	>1230.	2.5	119.	122.	215.	—	—
50.	15.6	83	0.0	8.2	9.6	279	0		108.	110.	124.	—	—
			0.0	9.5	7.9	274	0		126.	129.	145.	—	—
			0.0	10.7	6.2	268	0	1.5	139.	141.	166.	—	—
			0.0	12.0	4.3	264	0	1.8	146.	149.	184.	—	—
			0.0	12.9	3.0	262	0	2.0	148.	150.	200.	—	—
			3.1	14.1	1.0	258	>1230.	4.0	143.	147.	235.	—	—
24.	7.9	81	0.0	8.5	11.7	237	0	3.3	125.	123.	131.	—	—
			0.0	9.7	10.0	231	0	3.7	152.	155.	152.	—	—
			0.0	12.0	7.3	224	0	4.2	179.	181.	183.	—	—
			4.7	13.6	2.5	220	>1230.	4.3	130.	134.	230.	—	—



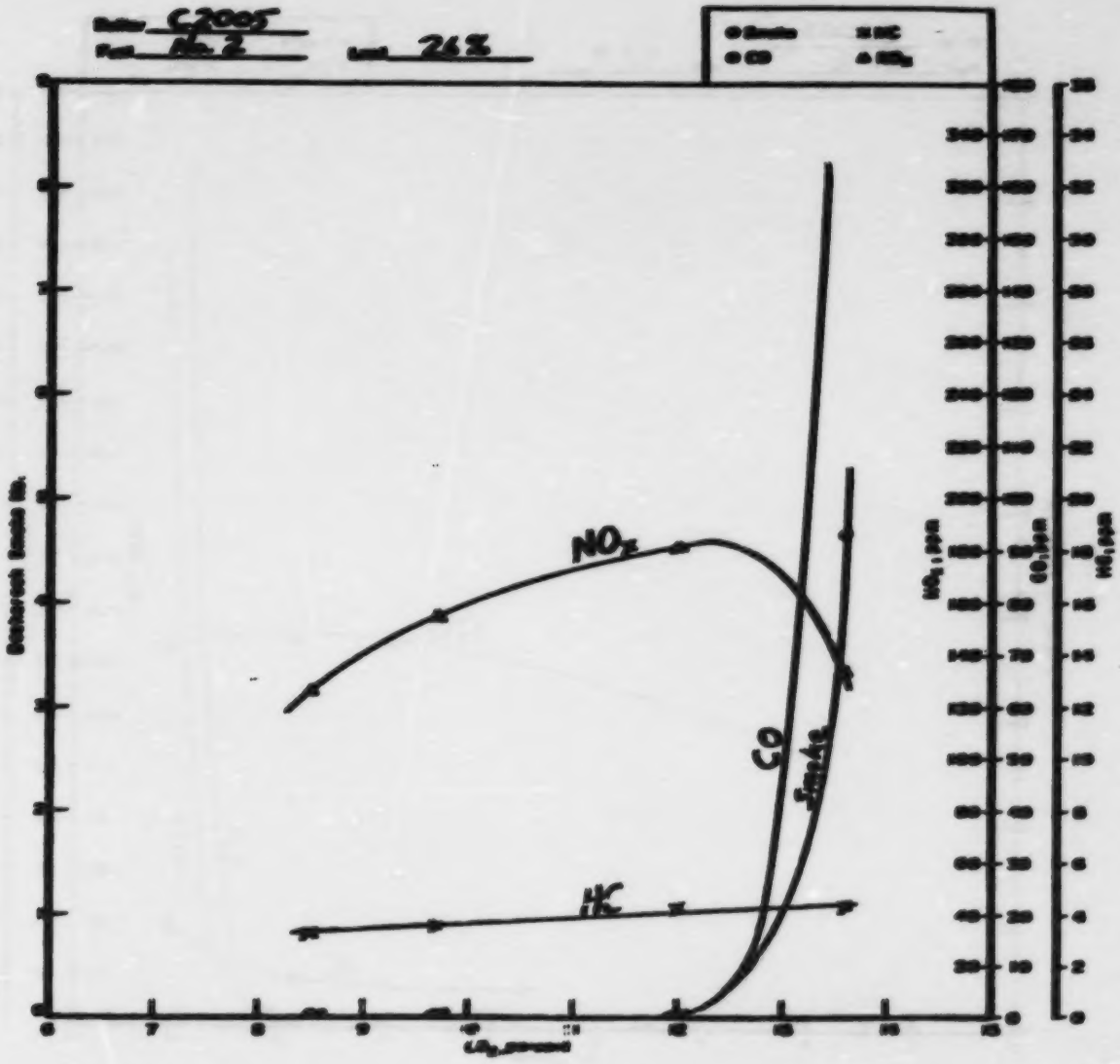
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

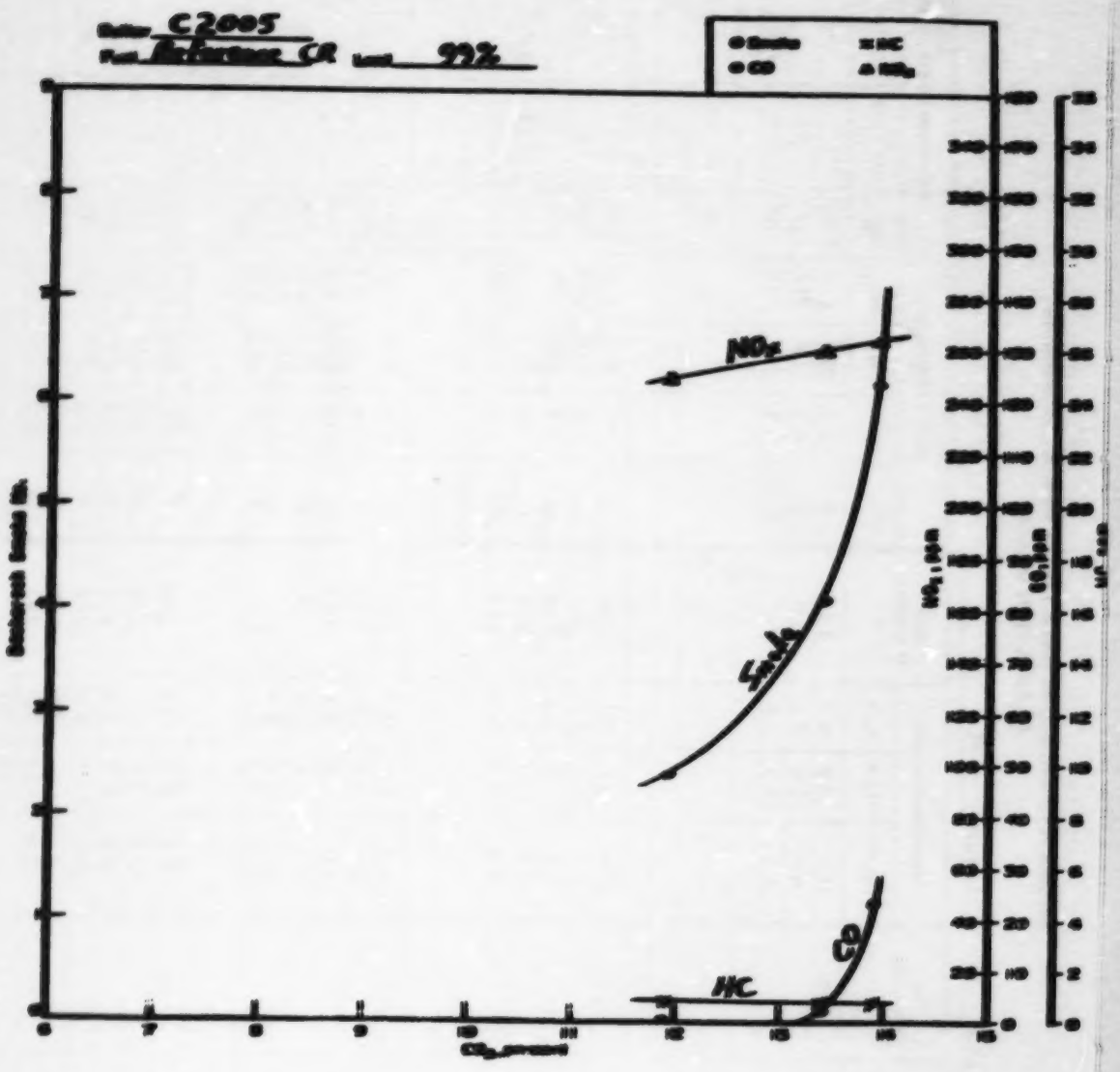


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

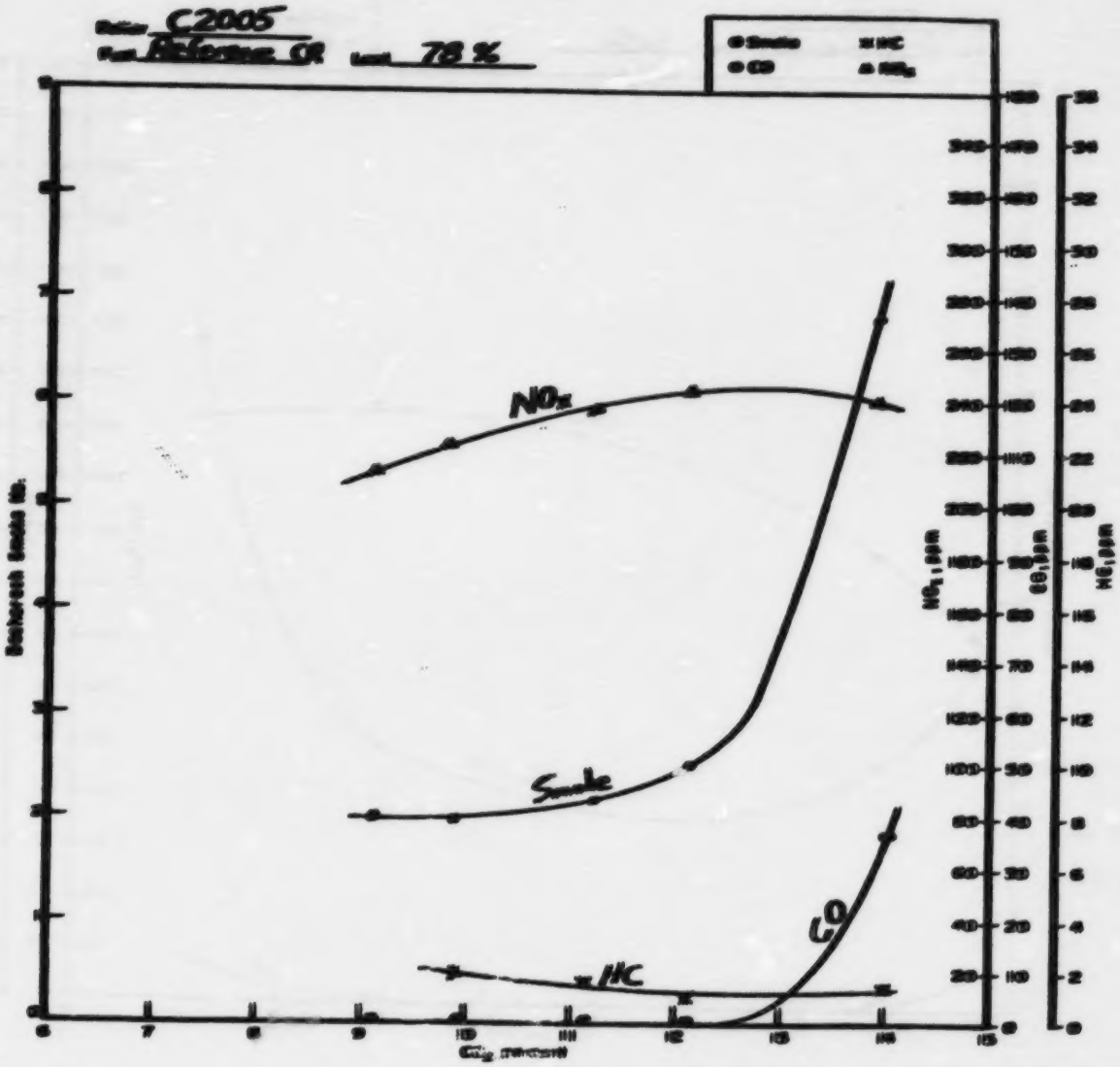
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2005 Fuel CR

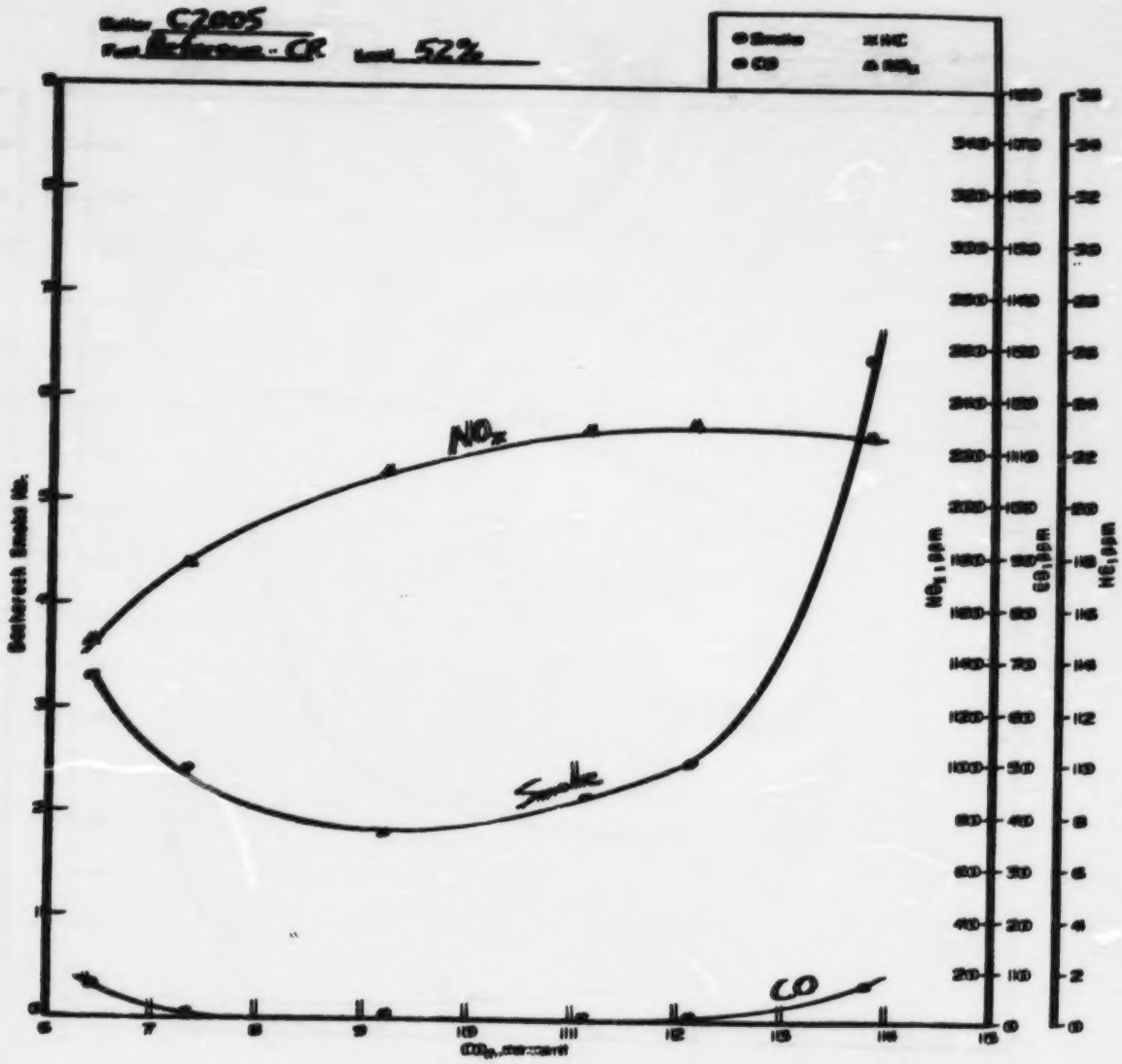
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/cm³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
98.	28.8	109	2.4	11.9	4.7	333	0	0.9	248.	250.	530.	—	—
			4.1	13.4	2.6	319	2.	0.9	258.	260.	610.	—	—
			6.2	13.9	1.8	315	23.	0.9	260.	264.	640.	—	—
72.	22.0	110	2.0	9.1	8.5	316	0	—	208.	213.	400.	—	—
			2.0	9.8	7.4	312	0	2.0	219.	222.	440.	—	—
			2.2	11.2	5.6	305	0	1.7	232.	238.	510.	—	—
			2.5	12.1	4.5	302	0	1.0	238.	243.	550.	44.6	68.5
			6.8	13.9	2.0	292	37.	1.5	232.	240.	630.	—	—
51.	15.1	111	3.3	6.4	12.5	296	6.	<10.	147.	147.	270.	—	—
			2.4	7.3	11.1	292	0	<10.	171.	177.	320.	—	—
			1.8	9.2	8.2	283	0	<10.	208.	211.	400.	—	—
			2.2	11.1	5.6	275	0	<10.	223.	228.	500.	—	—
			2.5	12.1	4.3	271	0	<10.	226.	230.	540.	—	—
			6.4	13.8	1.8	264	7.	<10.	222.	227.	620.	—	—
24.	7.1	109	3.6	5.9	13.0	240	5.	6.5	125.	132.	230.	—	—
			2.9	7.0	11.1	238	0	7.0	167.	174.	290.	—	—
			2.4	8.3	9.9	235	0	7.5	204.	210.	350.	—	—
			2.5	10.3	6.2	228	0	8.5	251.	260.	440.	—	—
			3.4	12.1	3.8	224	0	6.5	313.	313.	520.	—	—
			7.0	13.7	2.0	221	0	5.5	312.	315.	600.	—	—
				14.0	1.5		640.					—	—



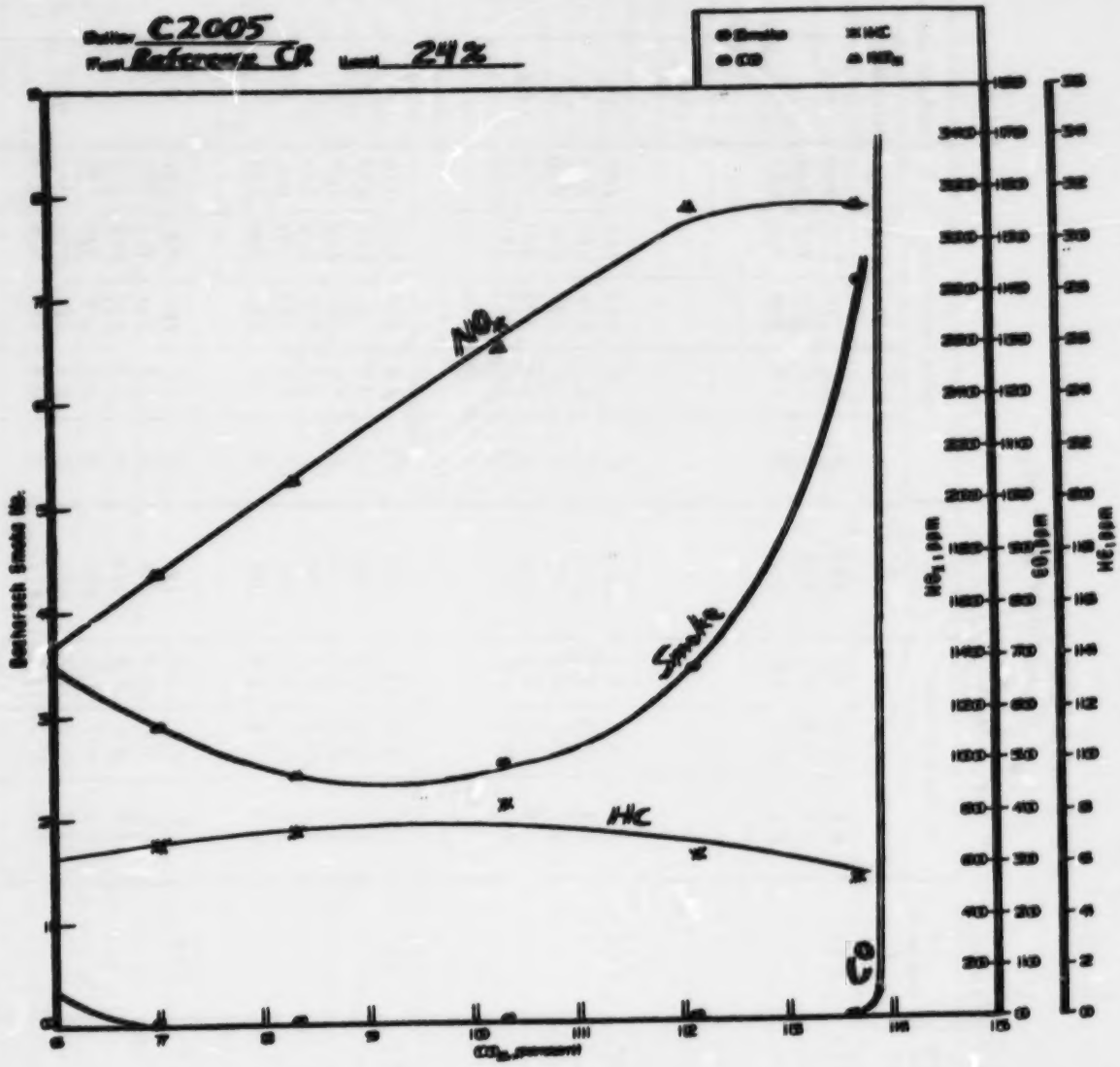
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

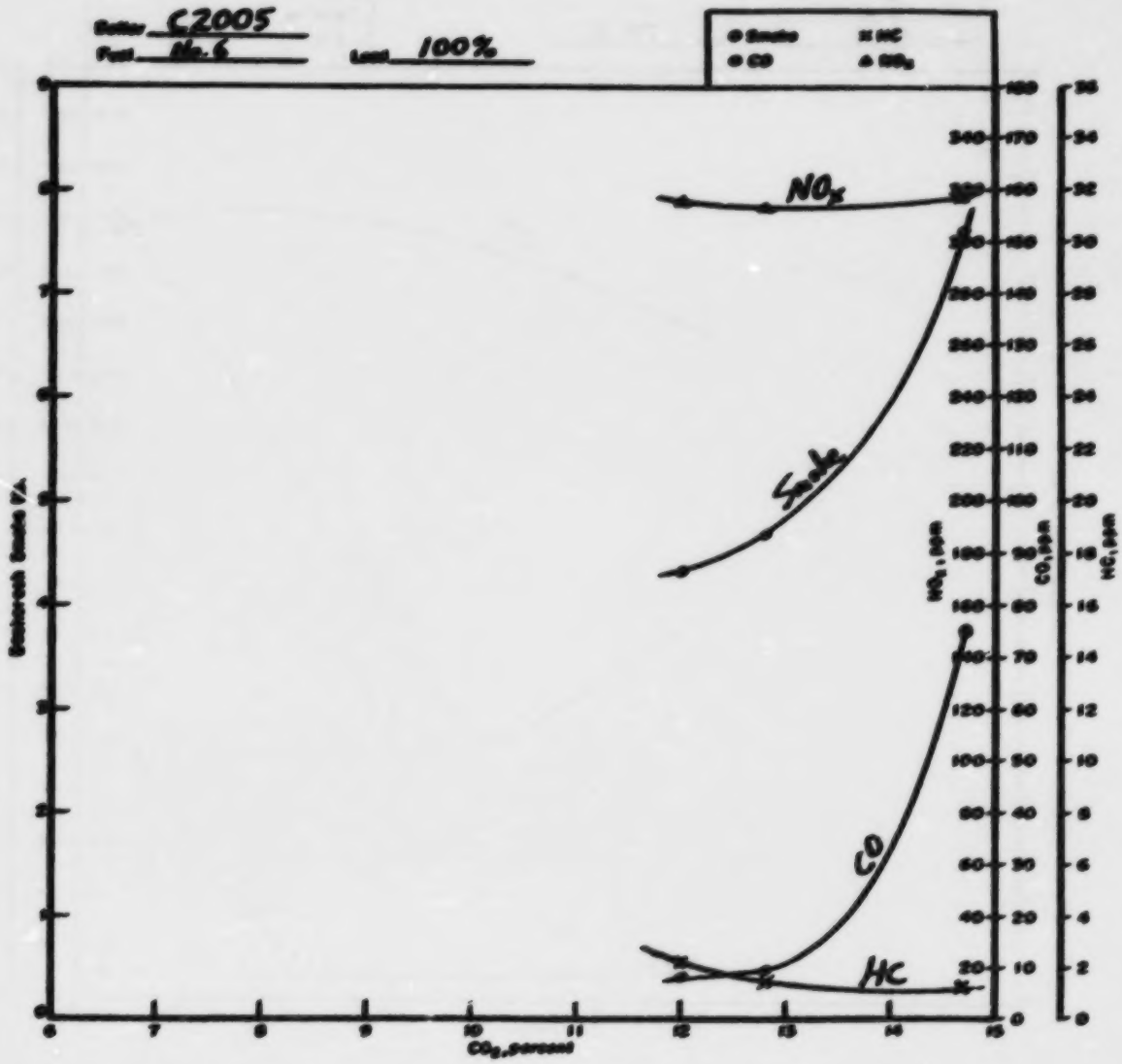


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

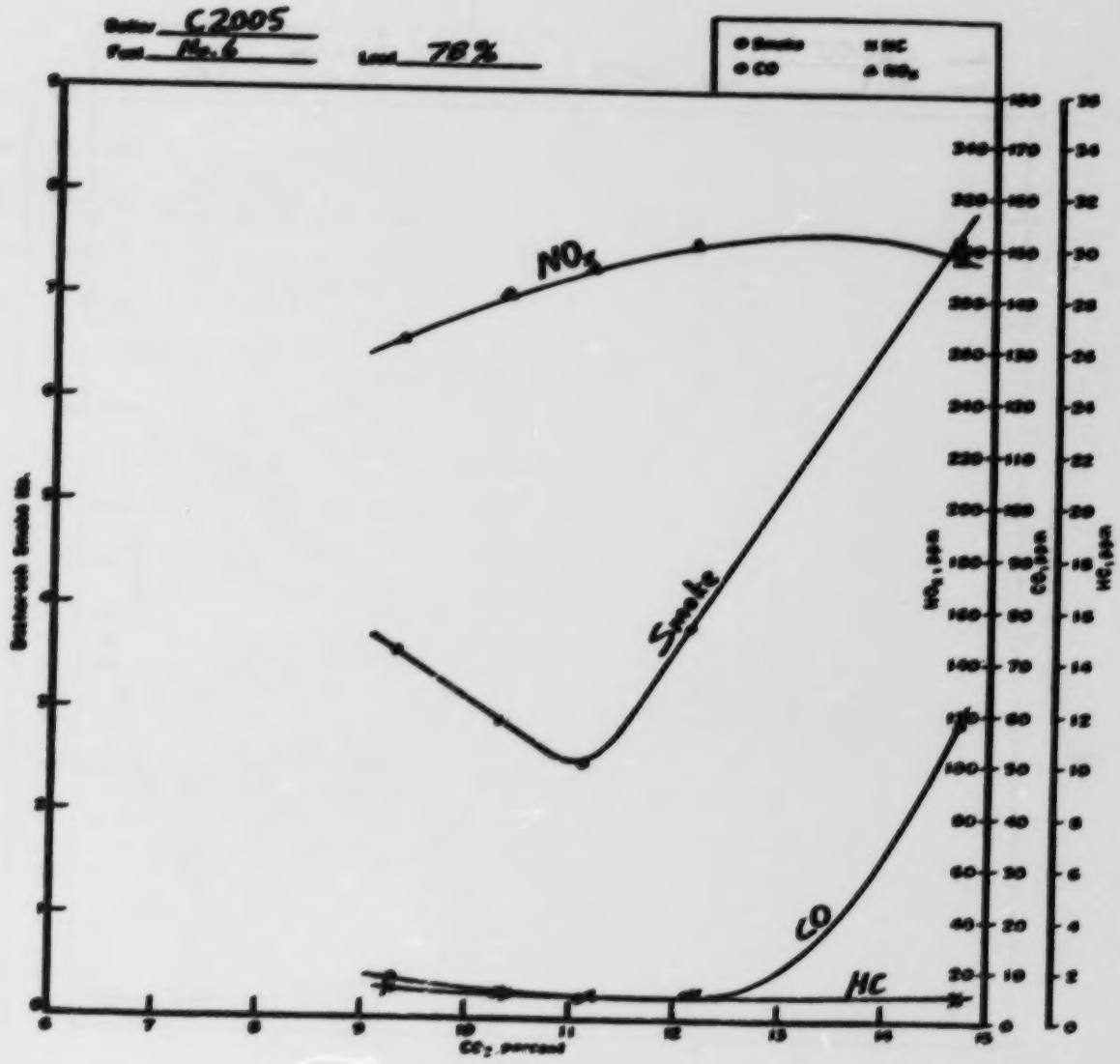
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2005 Fuel No. 6

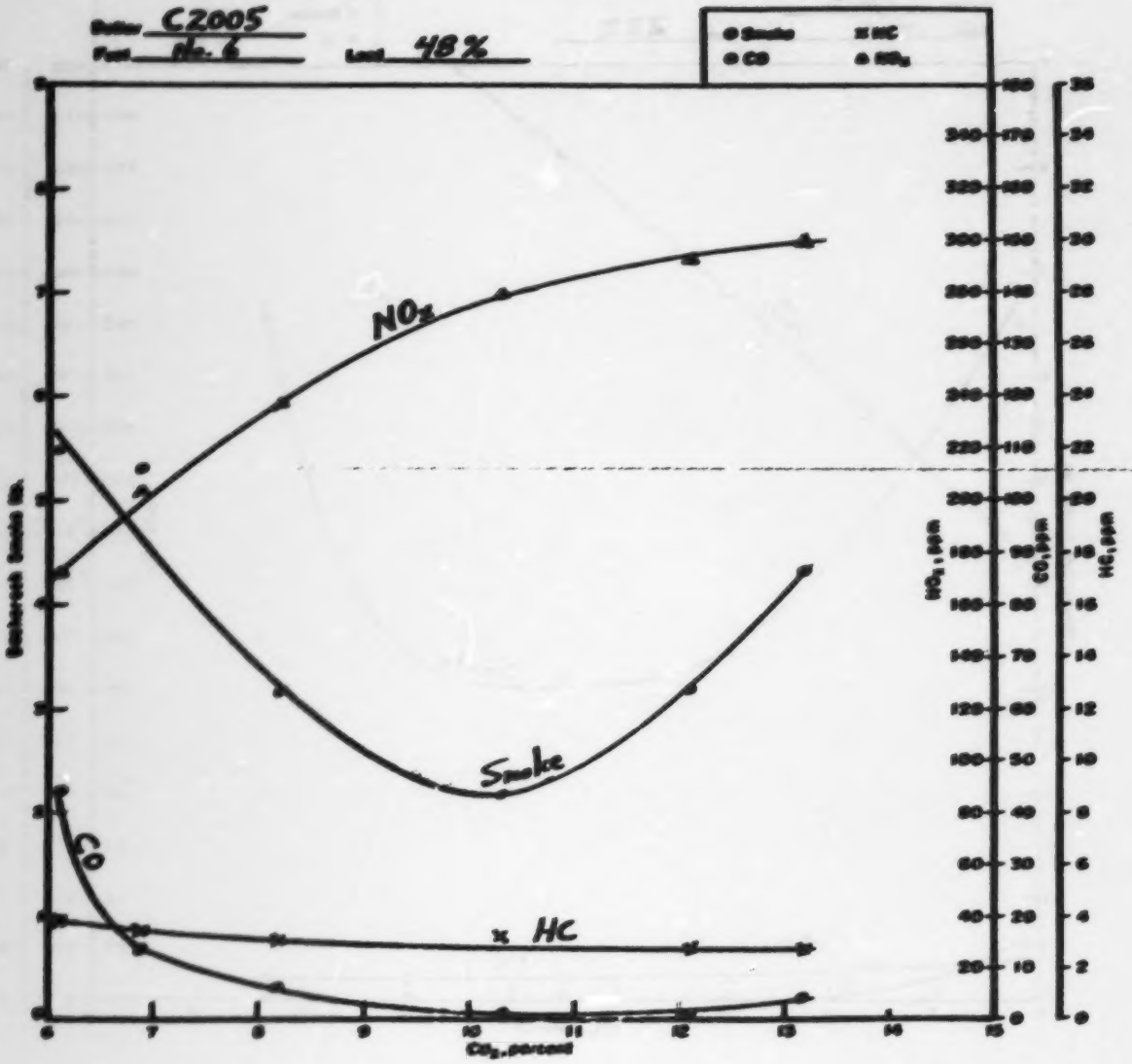
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/m³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + Filter	Total
99.	279	206	4.3	12.0	5.1	324	8.	2.2	311.	316.	900.	—	—
			4.7	12.8	4.1	318	3.	1.5	312.	312.	940.	—	—
			2.6	14.7	1.6	307	75.	1.2	318.	318.	1120.	—	—
72	218	206	3.6	9.3	8.7	317	8.	1.1	263.	263.	680.	—	—
			2.9	10.3	7.5	311	5.	1.0	276.	281.	750.	—	—
			2.5	11.1	6.5	309	4.	1.0	288.	294.	820.	—	—
			3.8	12.1	5.3	306	5.	1.0	293.	301.	930.	102.	156.
			2.6	14.7	1.8	291	58.	1.0	294.	292.	1120.	—	—
51.	14.4	205	5.5	6.1	13.1	290	44.	2.8	164.	172.	420.	—	—
			5.3	6.9	11.8	288	13.	2.4	196.	203.	490.	—	—
			3.2	8.2	9.9	282	6.	2.0	232.	238	580.	—	—
			2.2	10.3	7.0	275	1.	2.1	272.	272.	760.	—	—
			3.2	12.1	4.7	270	1.	2.8	283.	292.	900.	—	—
			4.3	13.2	2.4	265	4.	2.8	292.	300.	980.	—	—
24.	6.9	200	6.5	6.1	13.0	243	11.	1.4	166.	172.	430.	—	—
			5.2	7.6	10.8	240	2.	1.3	221.	226.	550.	—	—
			3.4	8.9	8.8	237	0	0.9	268.	270.	650.	—	—
			3.2	10.5	6.7	232	0	0.9	310.	326.	780.	—	—
			3.4	12.0	4.7	230	0	0.9	384.	384.	900.	40.9	84.3
			6.6	13.3	2.1	229	0	0.9	442.	420.	1020.	—	—



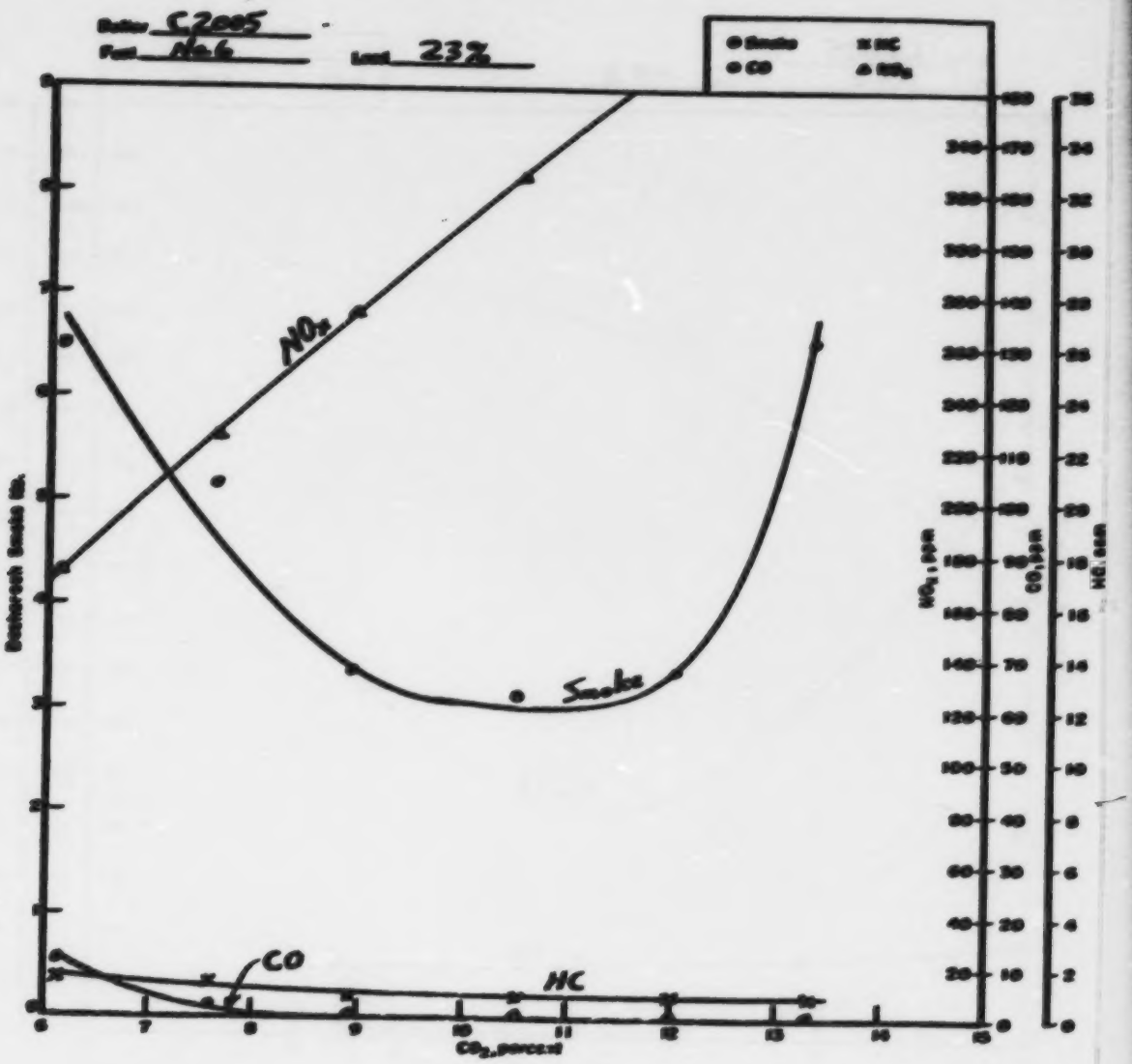
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

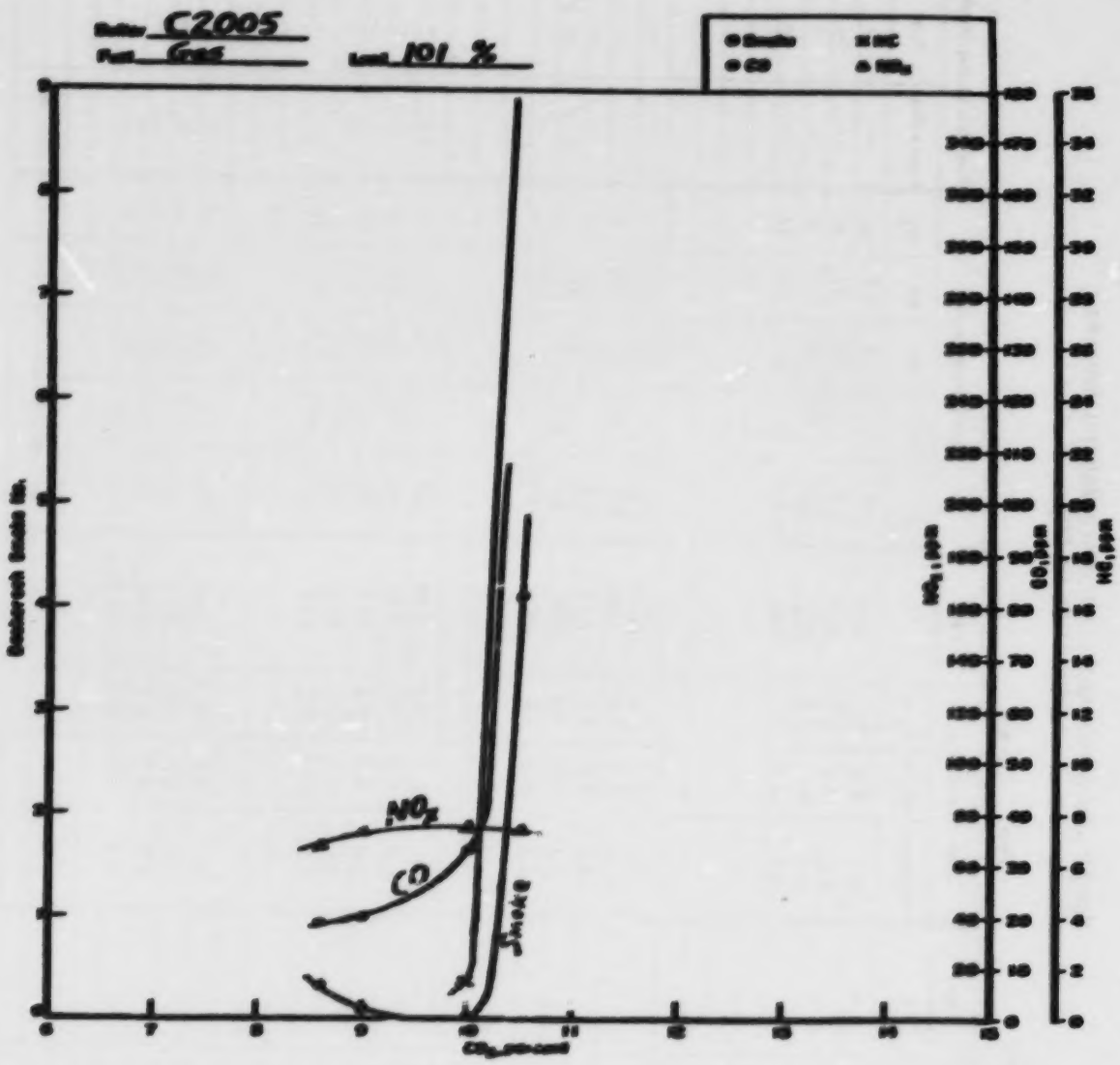


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

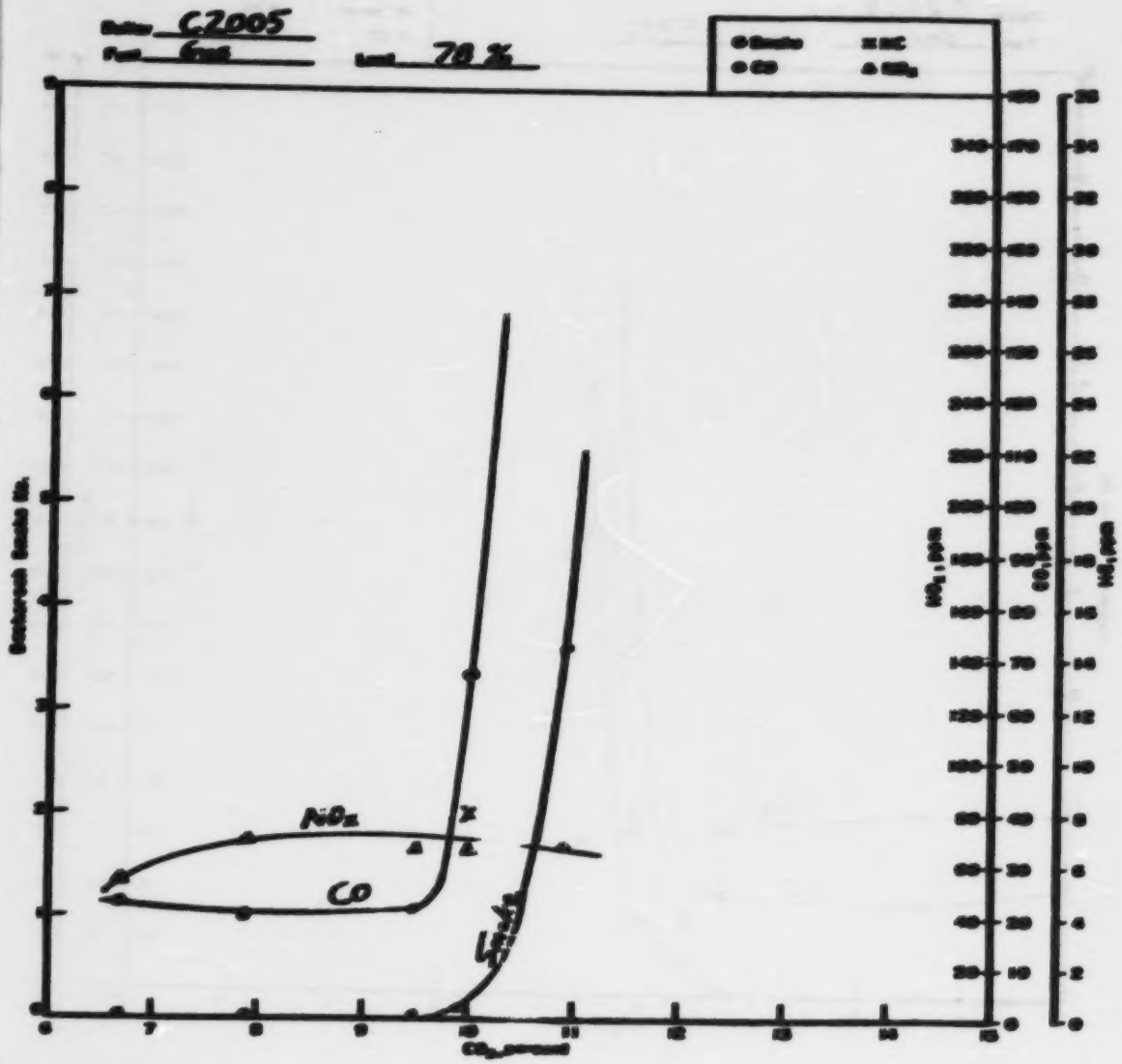
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2005 Fuel Gas

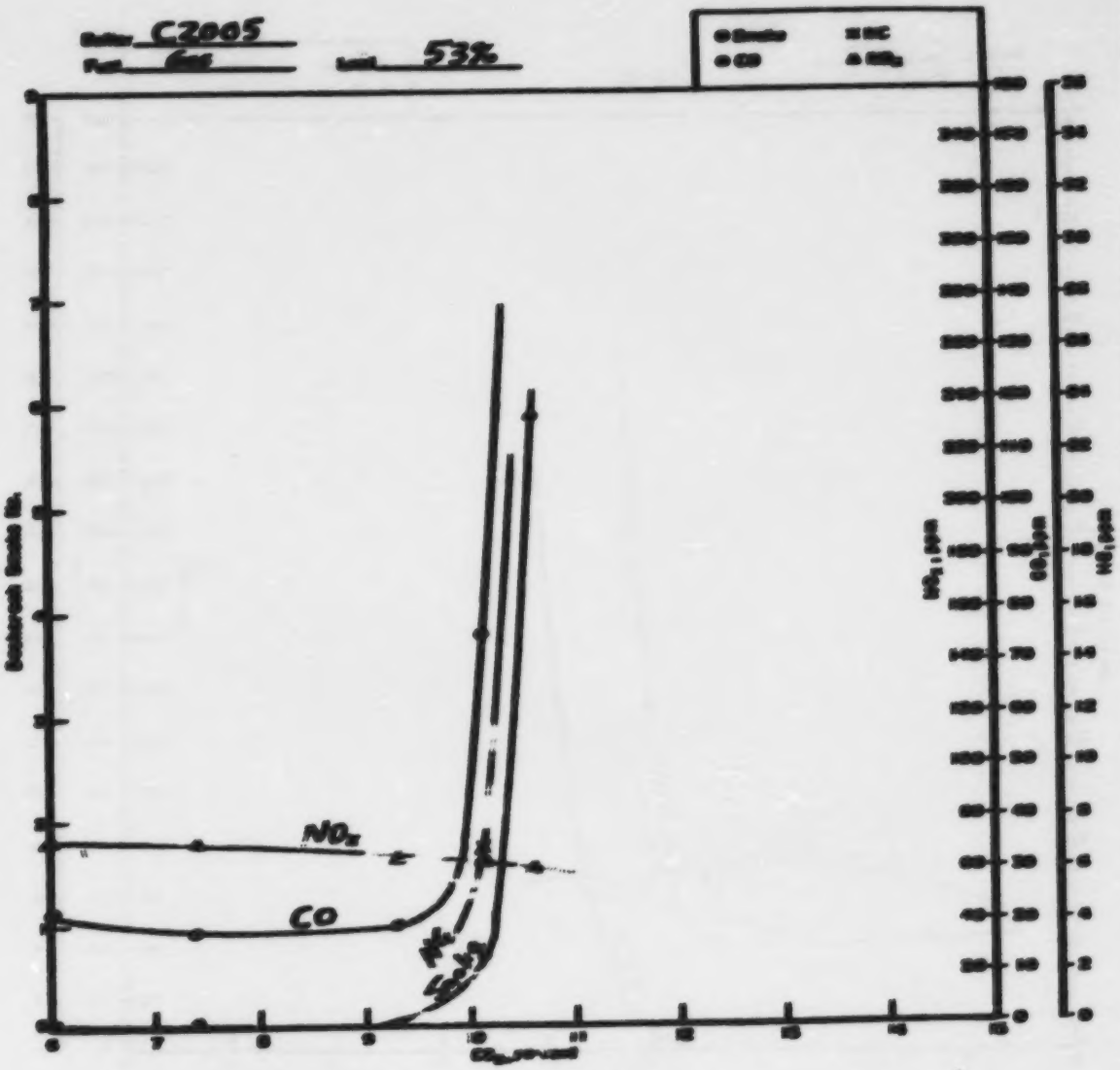
Load, percent	Firing Rate, cfh	Fuel Temperature, F	Combustion Condition			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/m³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
100.	4140.	–	0.3	8.6	5.7	323	19.	–	67.	68.	4.	–	–
			0.1	9.0	4.7	323	20.	–	70.	71.	4.	–	–
			0.0	10.0	3.9	327	33.	14	74.	75.	2.	–	–
			4.1	10.5	0.7	326	>1240.	38.0	66.	73.	61.	–	–
75	3210.	–	0.0	6.7	9.3	294	22.	–	52.	53.	0	–	–
			0.0	7.9	6.8	299	20.	–	63.	63.	0	–	–
			0.0	8.5	4.1	294	21.	–	64.	66.	0	–	–
			0.1	10.0	3.0	271	62.	8.0	63.	65.	0	2.7	16.7
			3.6	10.8	1.2	260	>1240.	–	62.	68.	0	–	–
52.	2170.	–	0.0	6.0	10.4	278	22.	–	72.	73.	0	–	–
			0.0	7.4	7.7	268	19.	–	71.	71.	0	–	–
			0.0	9.3	4.2	262	20.	–	65.	66.	0	–	–
			0.7	10.1	2.6	268	74.	70	68.	69.	0	–	–
			5.3	10.6	0.9	258	>1240.	400.	52	61.	30.	–	–
24	990.	–	0.0	4.8	13.2	243	83.	25	36.	45.	0	–	–
			0.0	6.6	8.9	240	0	3.5	81.	82	0	–	–
			0.3	8.4	5.4	232	0	4.0	86.	86.	0	–	–
			6.4	10.0	2.3	228	1110.	22.0	61.	62.	0	–	–



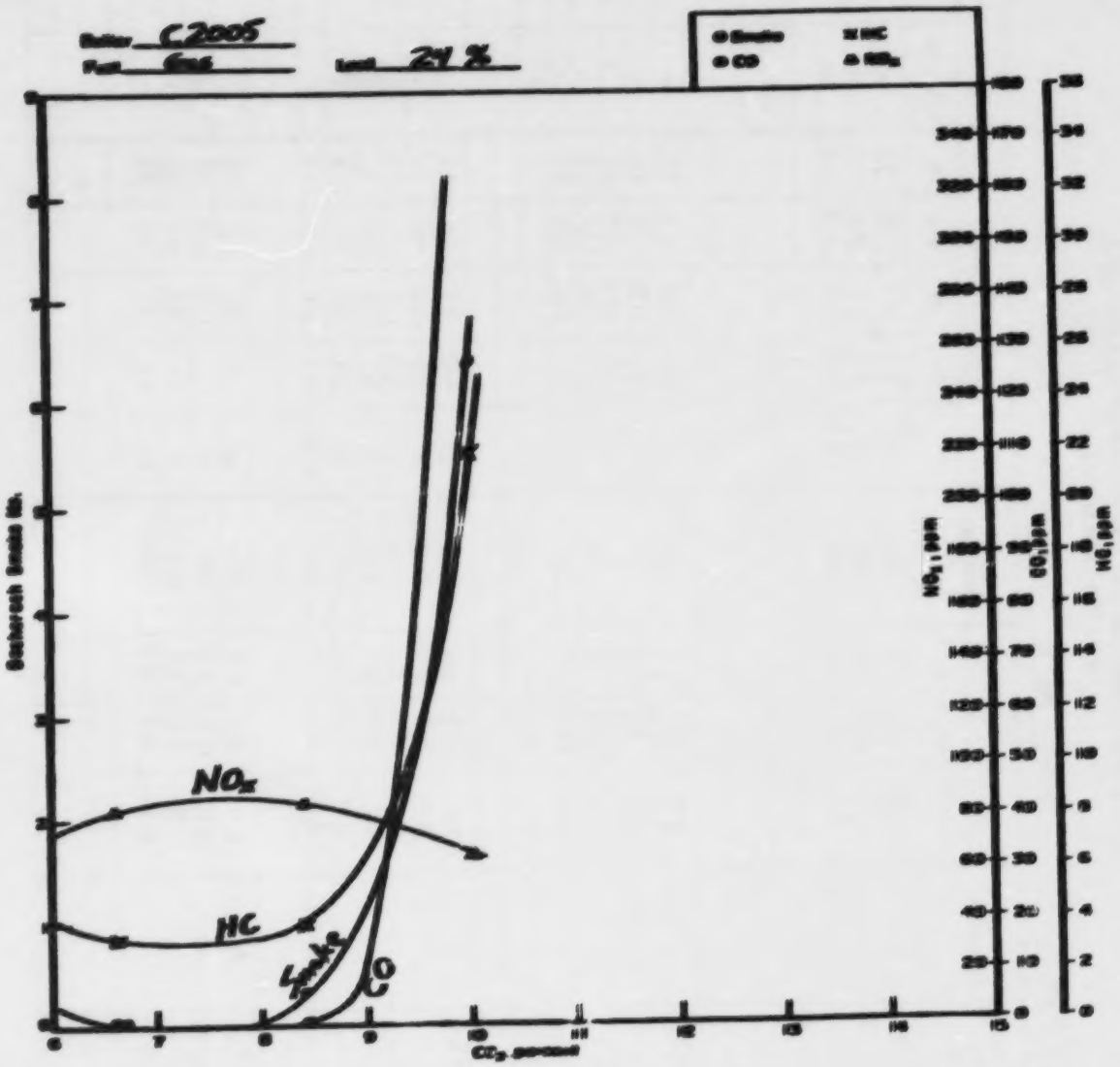
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

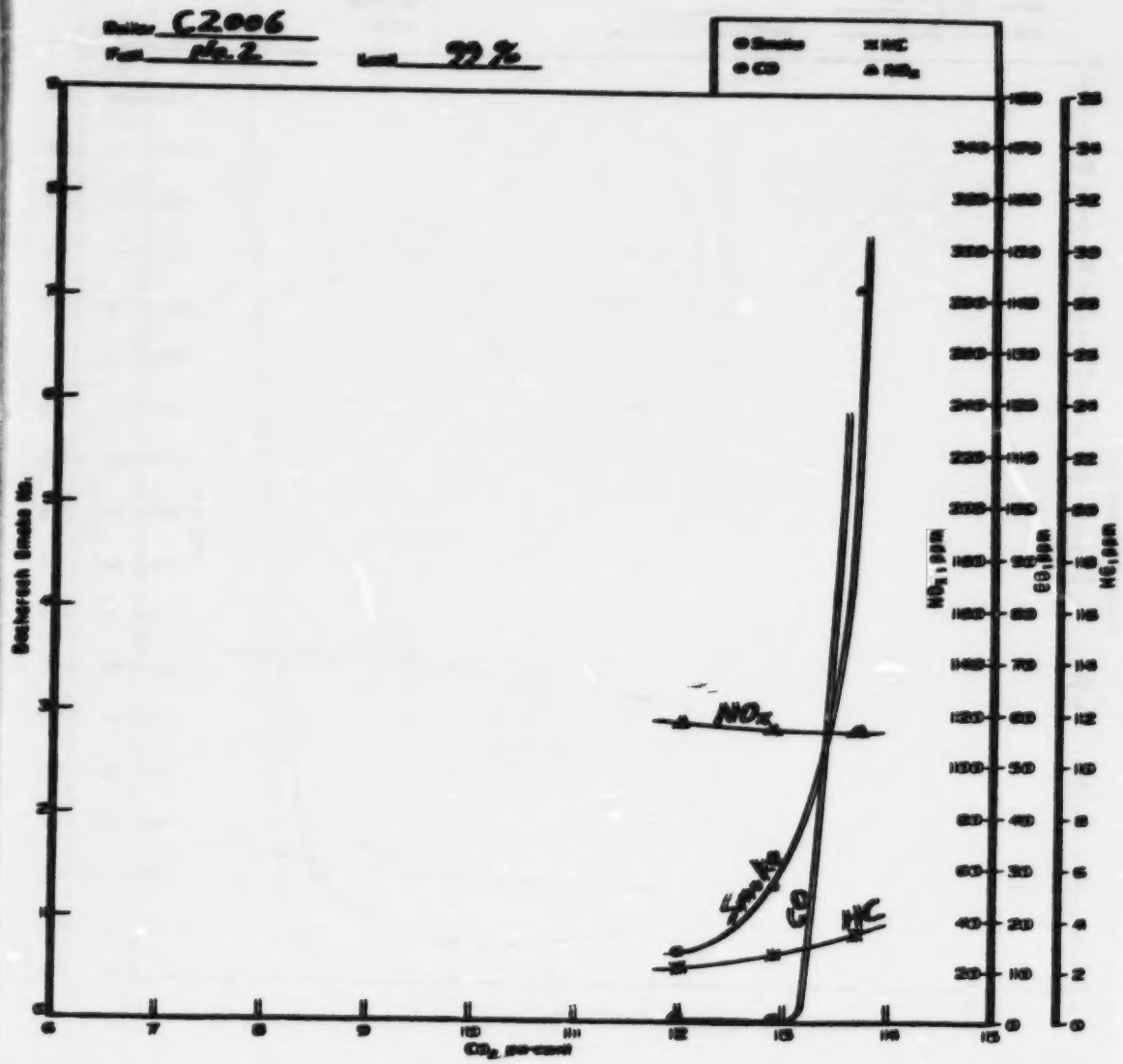


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

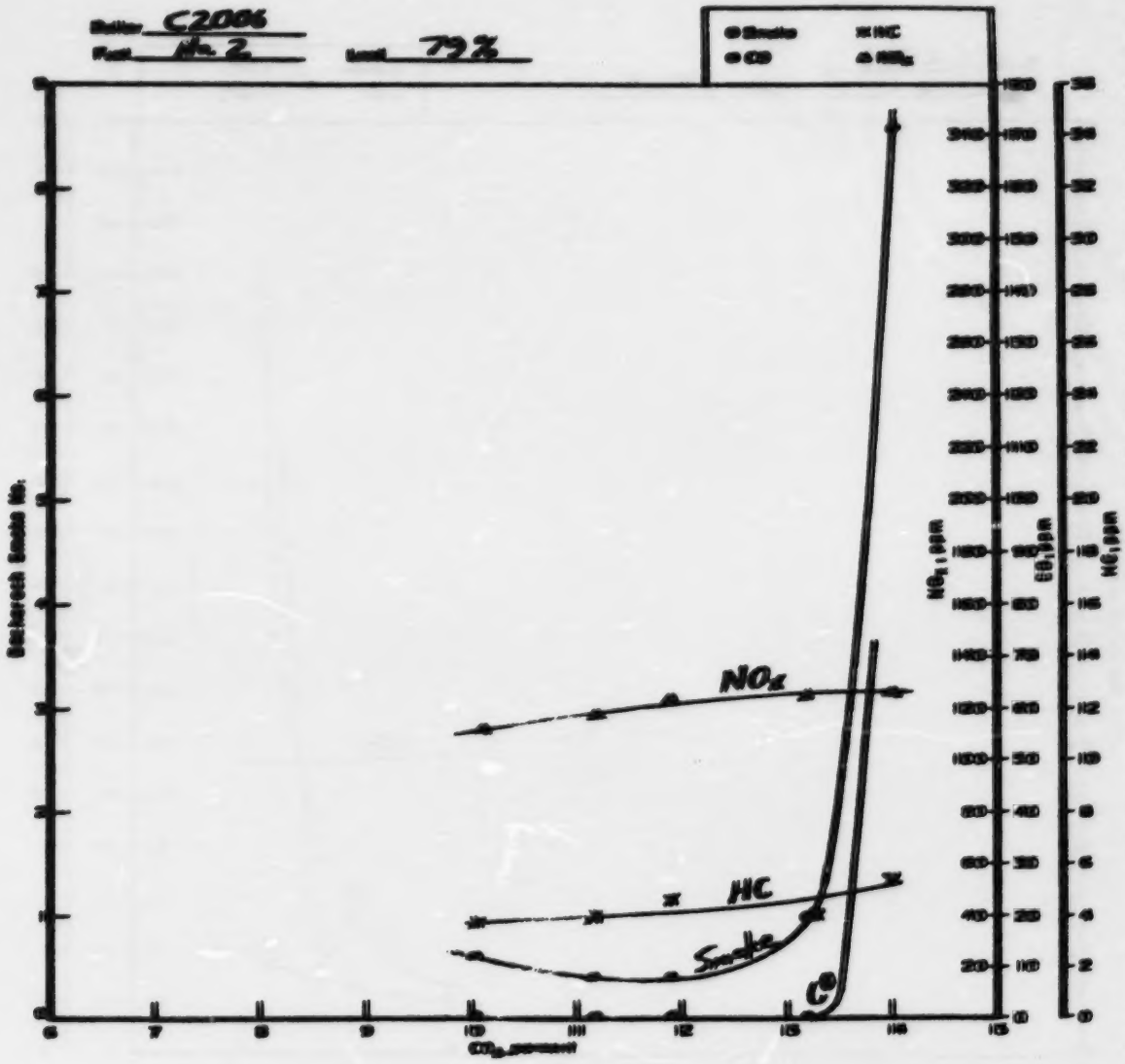
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2006 Fuel No. 2

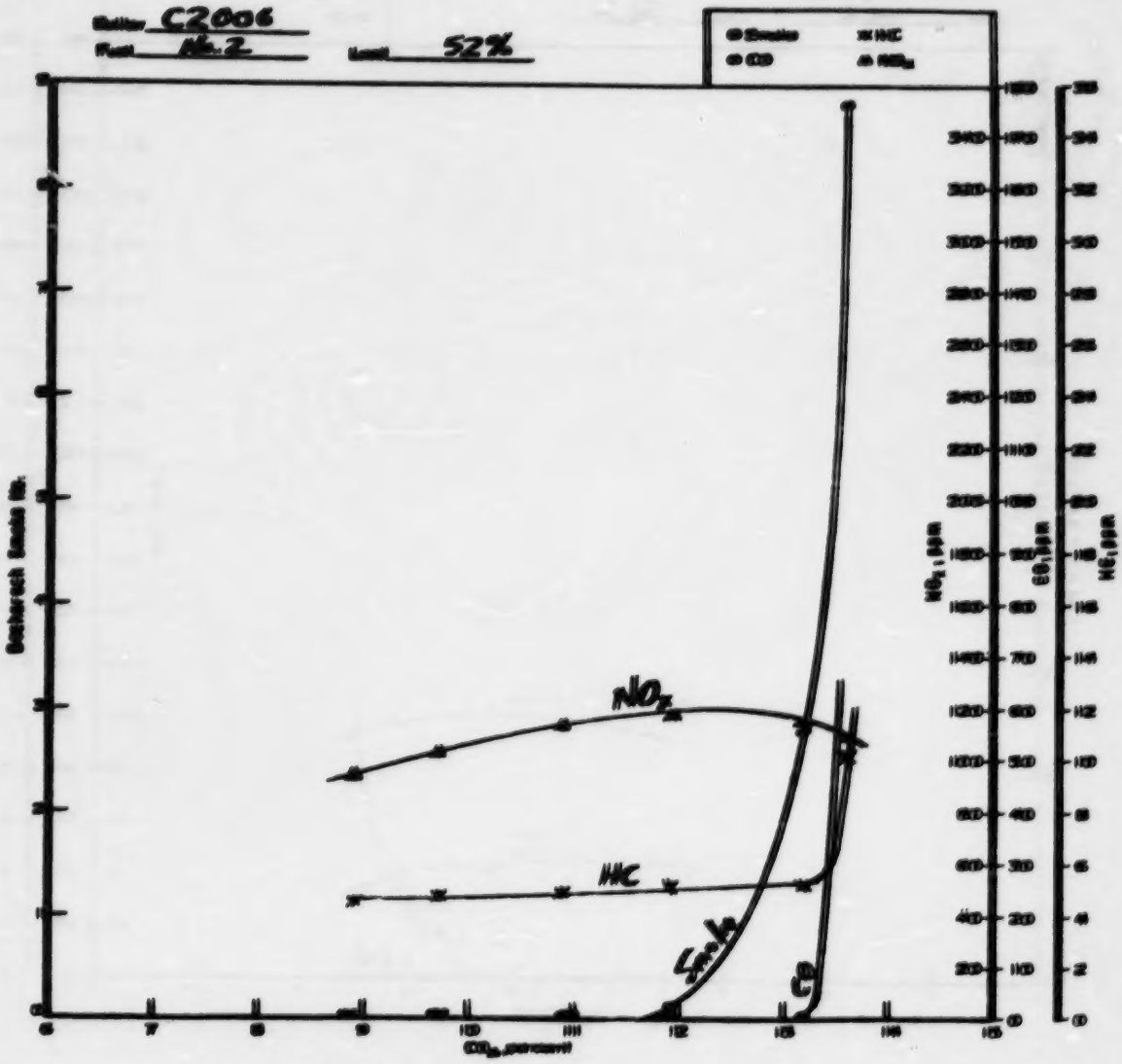
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/m³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
100.	172	70	0.7	12.0	3.5	440	0	2.1	112	112	91.	—	—
			1.3	12.9	2.0	433	0	2.8	115	115	100	—	—
			2.1	13.7	1.0	428	222.	2.4	112.	114.	102	—	—
72	142.	70	0.6	10.1	6.5	428	0	3.9	112.	112.	72.	—	—
			0.4	11.2	5.0	416	0	4.0	119	119.	80.	—	—
			0.4	11.9	3.8	410	0	4.7	124.	123.	86.	2.3	120
			1.0	12.2	1.8	395	0	4.1	126.	126.	95.	—	—
			8.6	14.0	0.5	382	>1230.	5.5	126.	127	112	—	—
52.	94	70	0.0	8.9	8.1	355	0	4.7	95.	95	67	—	—
			0.0	9.7	7.0	348	0	4.9	102.	102.	74	—	—
			0.0	10.9	5.1	332	0	5.0	114	114	82	—	—
			0.1	11.9	3.7	325	0	5.1	112	110.	91.	—	—
			2.8	12.2	1.6	312	0	5.2	115.	116.	102.	—	—
			8.0	13.6	1.0	308	830.	10.1	108.	110.	108.	—	—
36.	64.	70	0.0	9.7	6.5	280	0	4.6	94.	94.	74.	—	—
			0.0	11.2	4.3	270	0	4.1	104.	102.	82	—	—
			0.9	12.1	3.2	260	0	4.0	98.	100.	94.	—	—
			2.4	12.5	2.7	262	0	3.2	94.	95.	92.	—	—



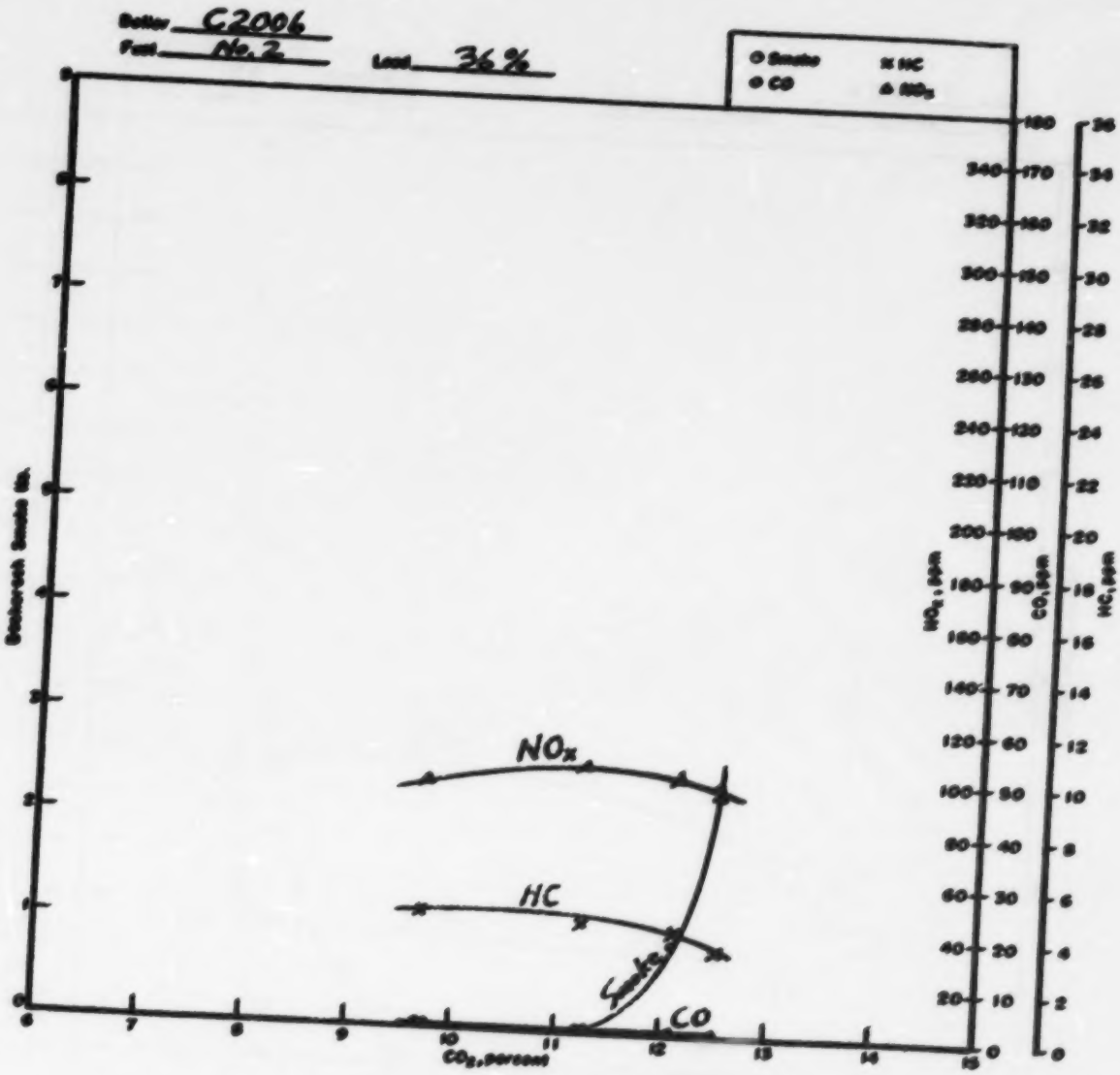
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

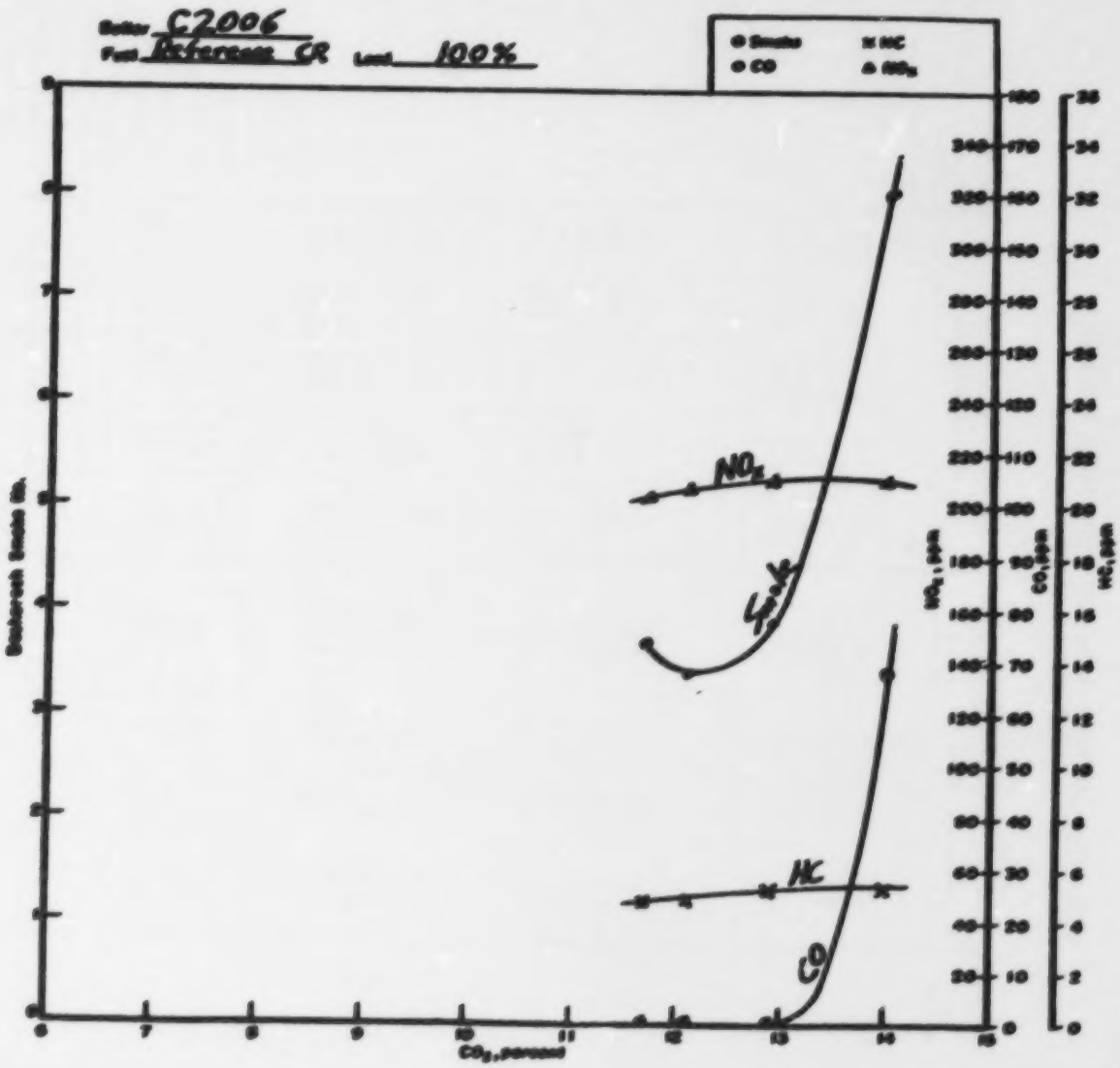


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

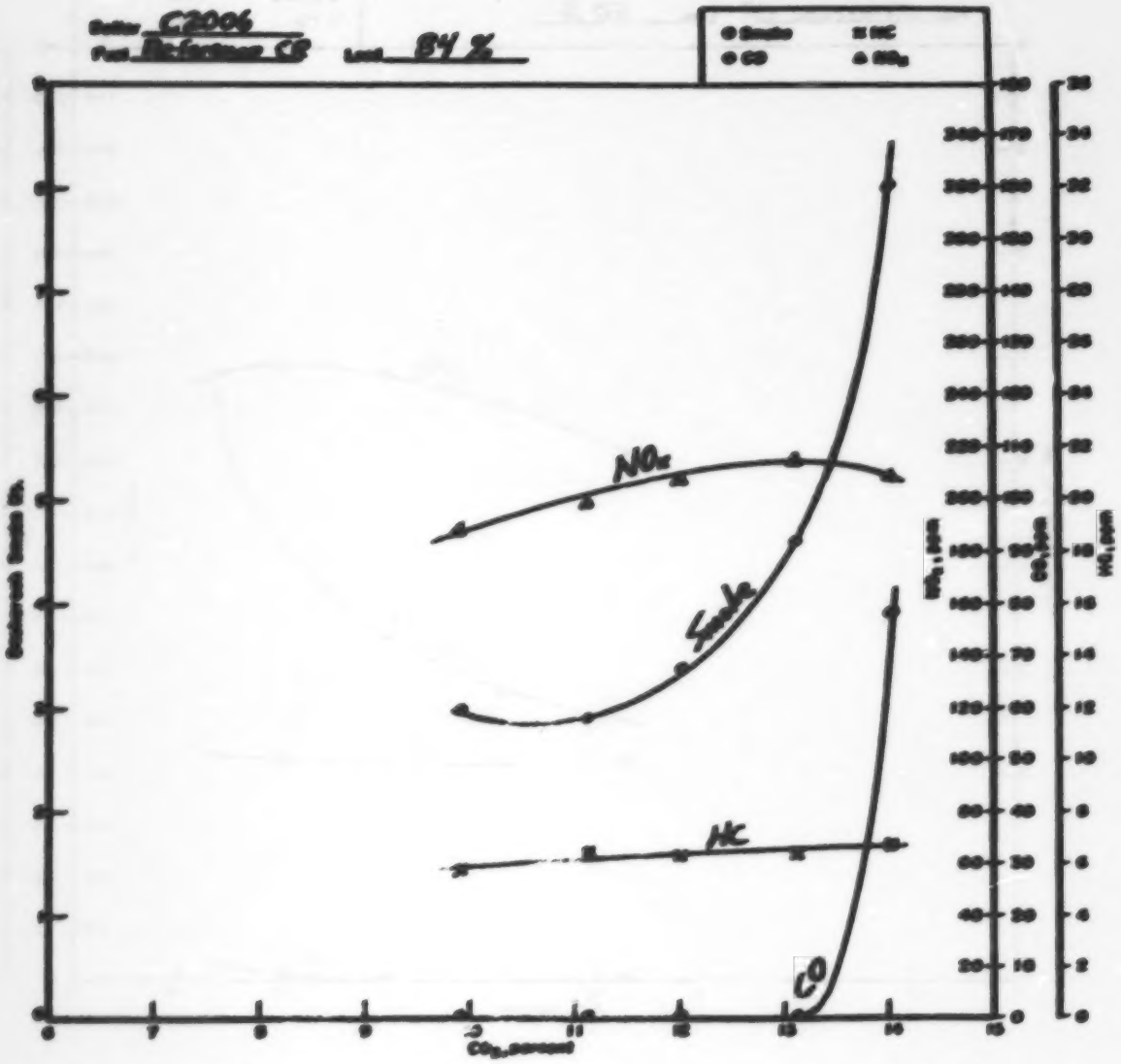
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2006 Fuel CR

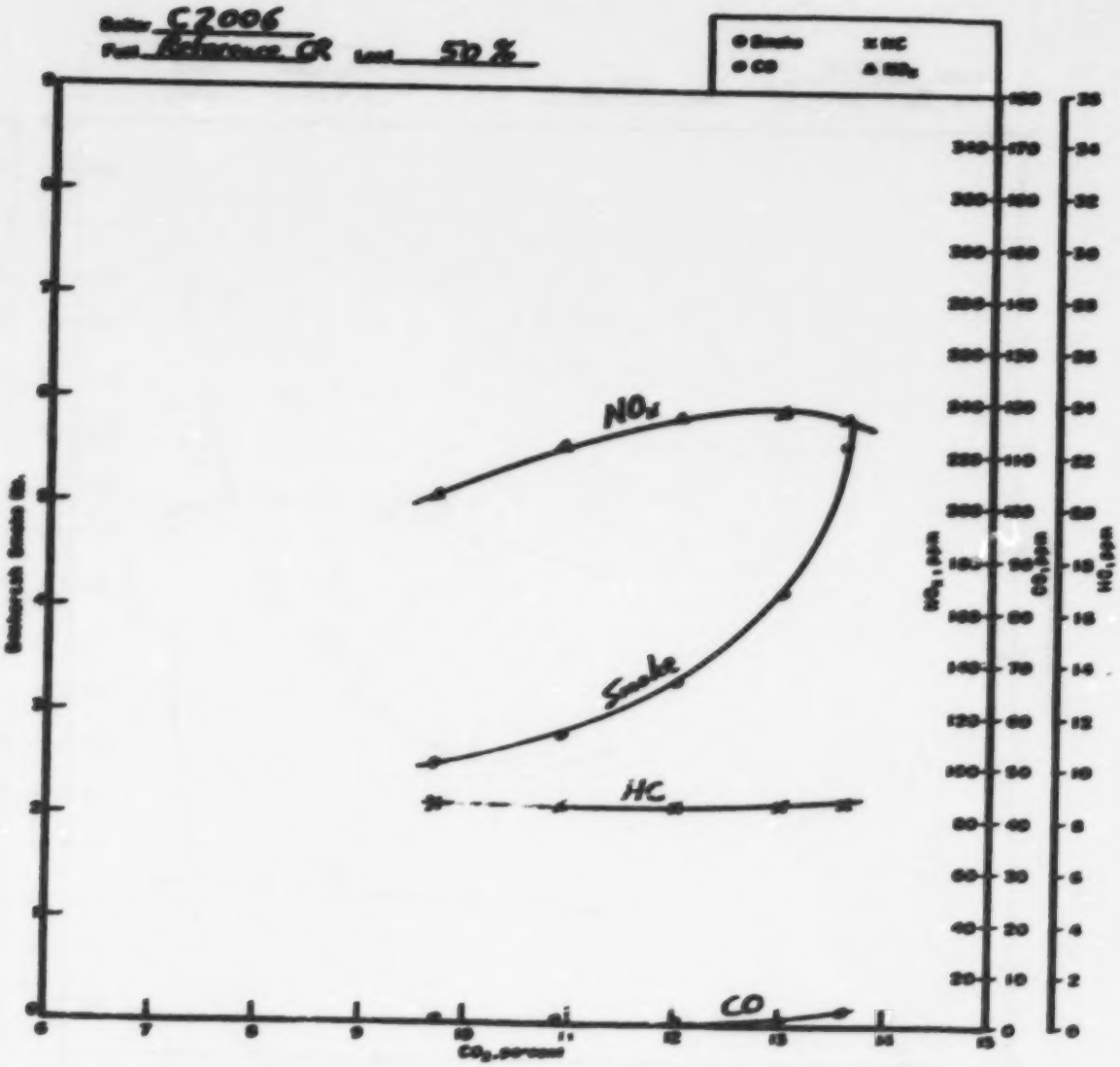
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/m³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + Filter	Total
101.	171.	139.	3.7	11.7	4.3	425	0	4.8	203.	203.	530.	–	–
			3.4	12.1	3.8	420	0	4.8	208.	208.	540.	–	–
			3.9	12.9	2.4	409	0	5.2	213.	210.	580.	–	–
			8.0	14.0	0.8	398	68.	5.3	210.	210.	630.	–	–
84.	143.	127	3.0	9.9	6.7	423	0	5.8	190.	188.	490.	–	–
			2.9	11.1	5.3	408	0	6.3	201.	198.	490.	–	–
			3.4	12.0	4.0	398	0	6.2	210.	208.	520.	66.6	93.7
			4.6	13.3	2.0	385	0	6.3	212.	215.	590.	–	–
			8.0	14.0	0.8	373	78.	6.3	210.	209.	620.	–	–
51.	86.	140	2.5	9.7	7.0	335	0	8.5	203.	203.	420.	–	–
			2.8	10.9	5.3	325	0	8.5	222.	222.	470.	–	–
			3.3	12.0	3.7	311	0	8.5	234.	234.	520.	–	–
			4.2	13.0	2.2	305	0	8.6	238.	232	560.	–	–
			5.6	13.6	1.3	300	2.	8.7	238.	235.	590.	–	–
37.	63.	144	3.8	11.6	4.4	270	0	8.7	231.	228.	490.	–	–
			–	11.9	4.1	270	0	8.5	232.	232.	510.	–	–
			8.6	13.8	1.4	258	113.	8.5	195.	195.	590.	–	–



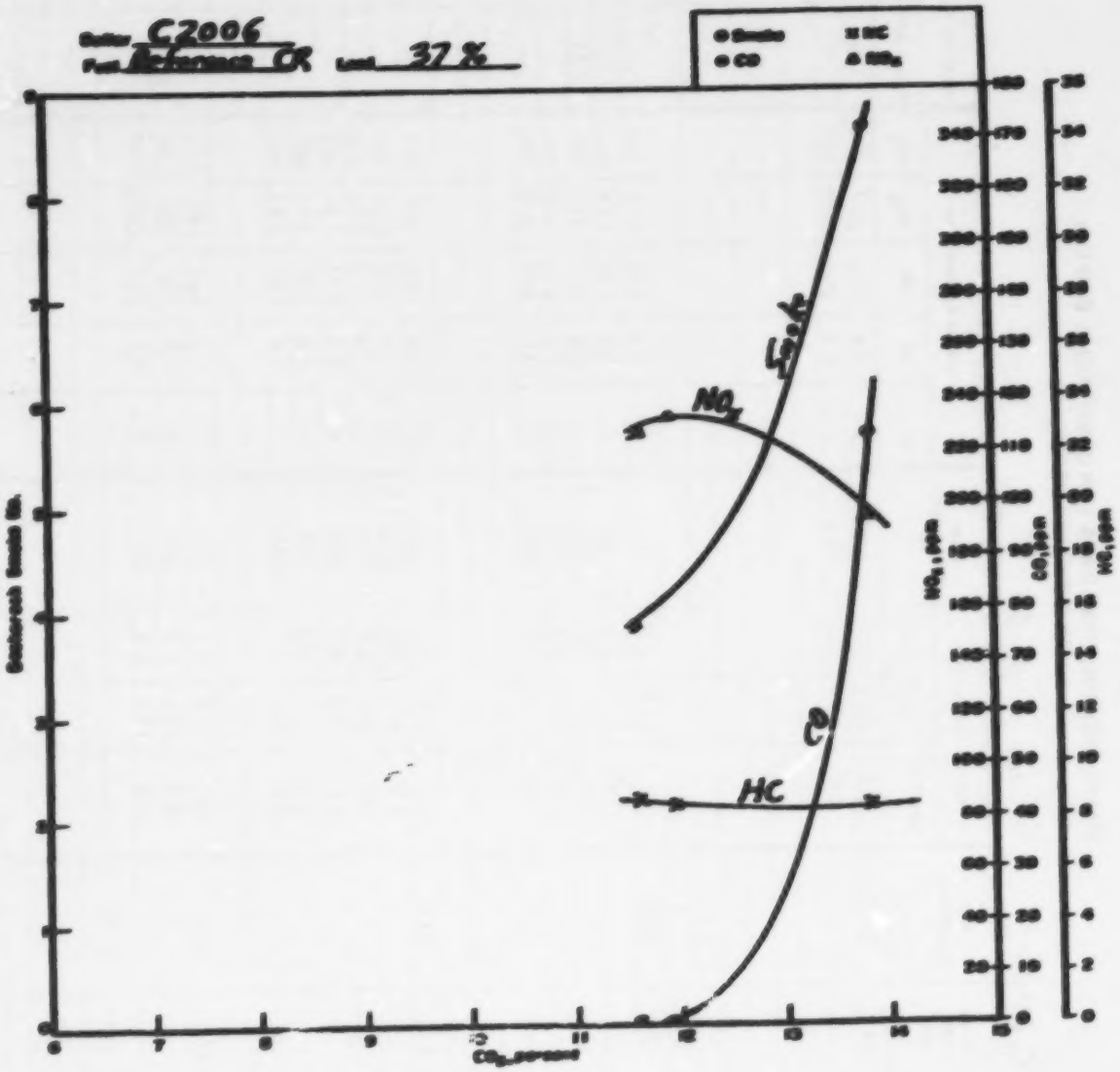
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

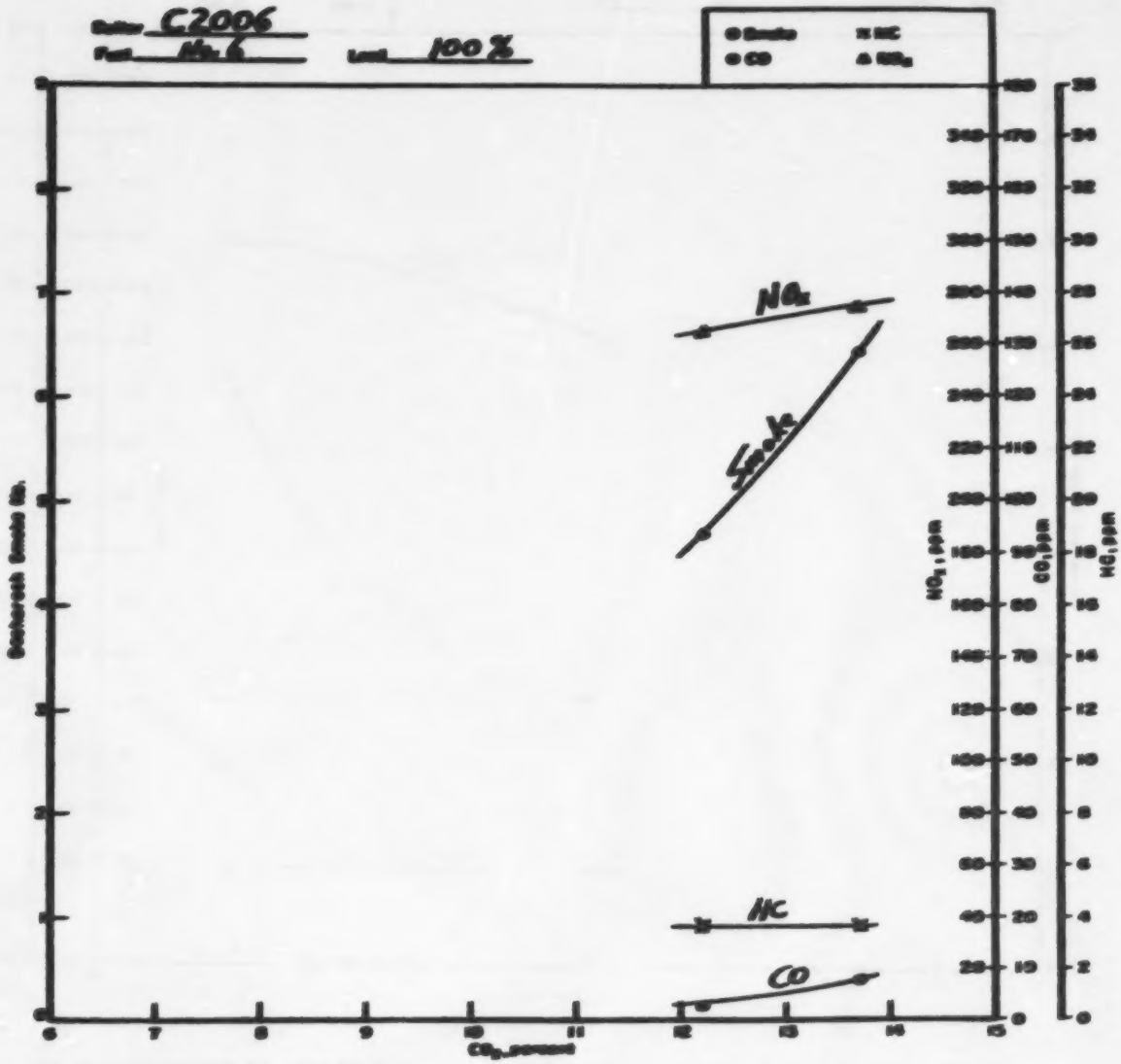


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

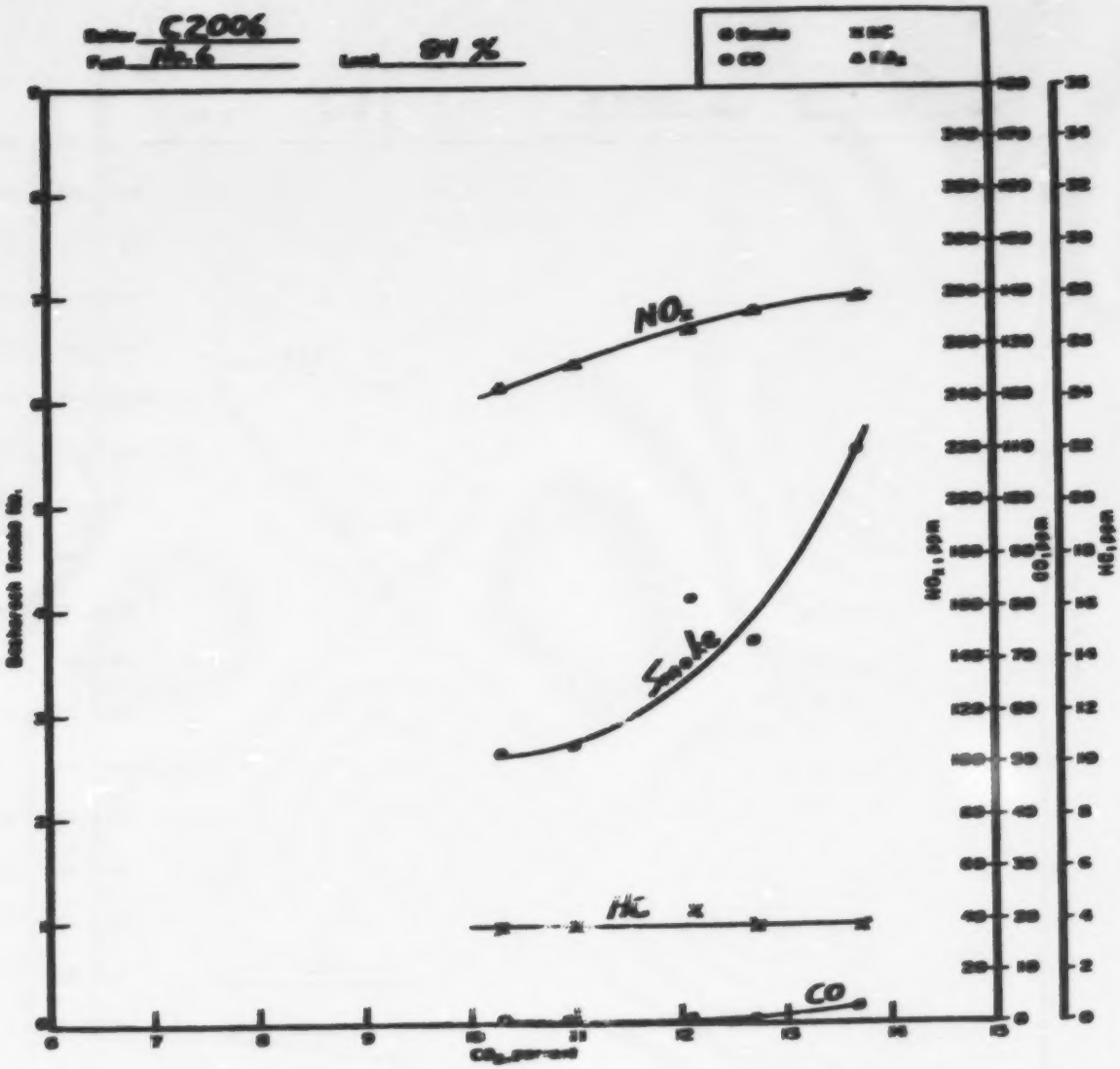
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2006 Fuel No. 6

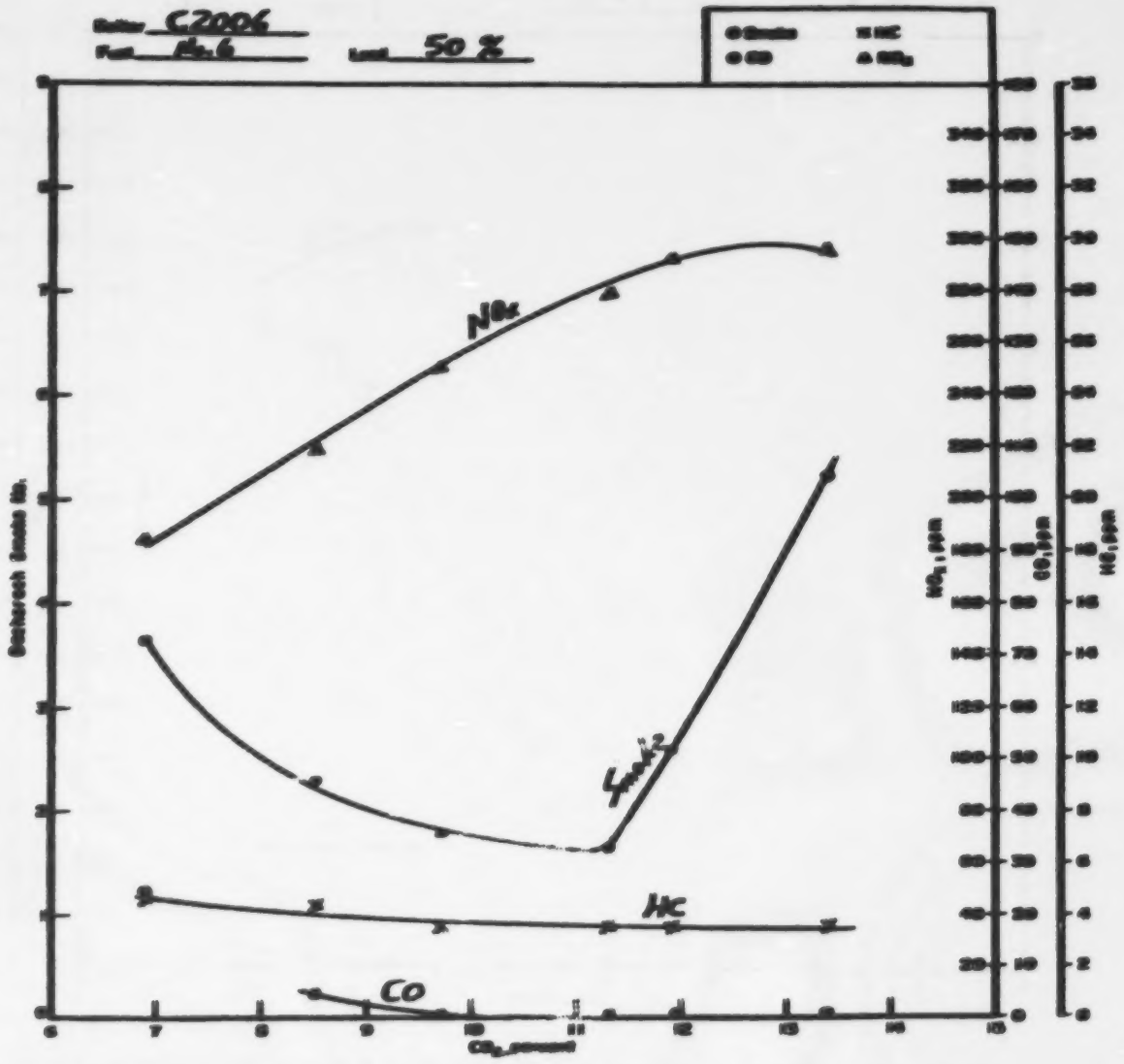
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/cm³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + Filter	Total
100.	165.	212	4.7	12.3	3.7	443	2.	3.8	264	264	670.	—	—
			6.4	13.7	1.6	422	6.	3.8	278.	274	710.	—	—
84.	139.	212	2.6	10.3	6.4	413	0	3.8	241	242	580.	—	—
			2.7	11.0	5.5	405	0	3.8	250.	252.	600.	—	—
			4.1	12.1	4.1	395	0	4.2	262	266.	660.	235.	286.
			3.7	12.7	3.2	390	0	3.8	270	272.	700.	—	—
			5.5	13.7	1.7	380	2.	3.8	270	270	750.	—	—
50.	82.	210	3.7	6.9	11.4	365	25.	4.8	172.	187	360.	—	—
			2.3	8.5	8.7	349	5.	4.5	214	220.	460.	—	—
			1.8	9.7	6.8	338	0	3.8	248	251	530.	—	—
			1.7	11.3	4.7	324	0	3.8	283.	280.	620.	—	—
			2.6	11.9	4.0	319	0	3.8	290	294	650.	—	—
			5.2	13.4	1.7	308	0	3.8	292.	297	750.	—	—
37.	61.	210	4.2	11.8	5.1	278	0	4.8	282.	286.	620.	—	—
			5.2	12.1	3.8	269	0	4.8	280.	286.	650.	72.5	226.
			6.2	12.2	2.8	260	2.	4.8	267	267	700.	—	—



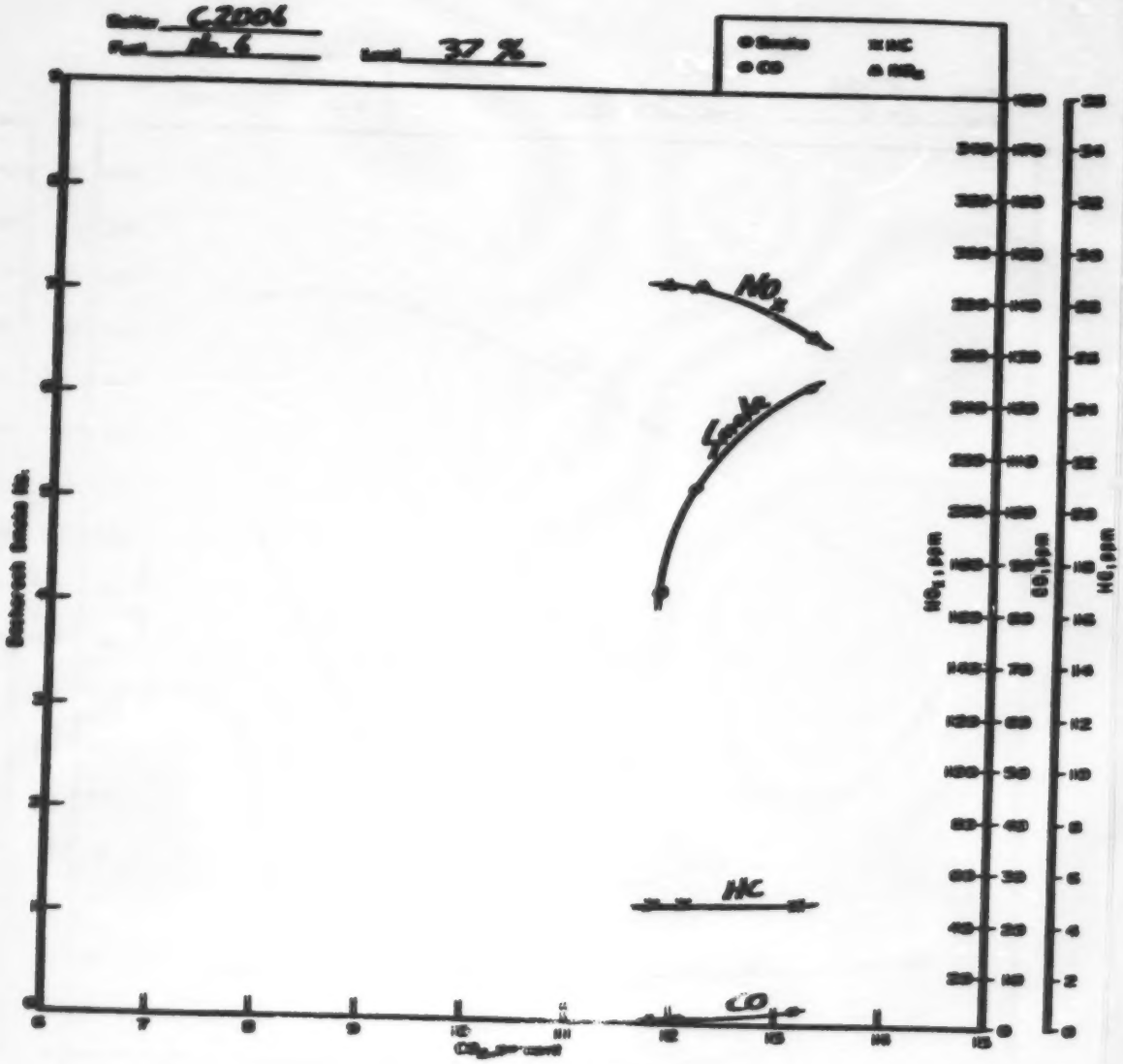
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

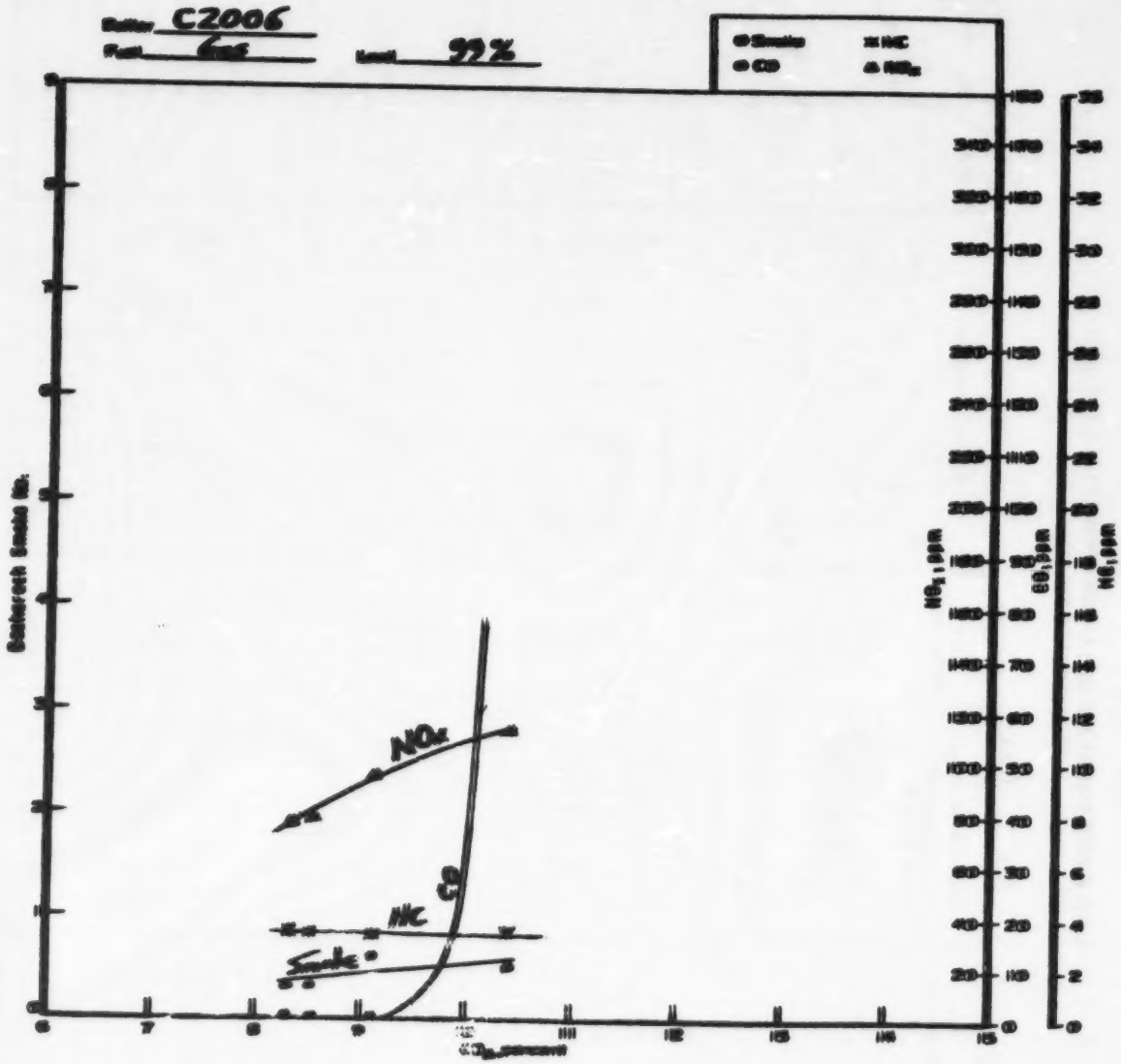


SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

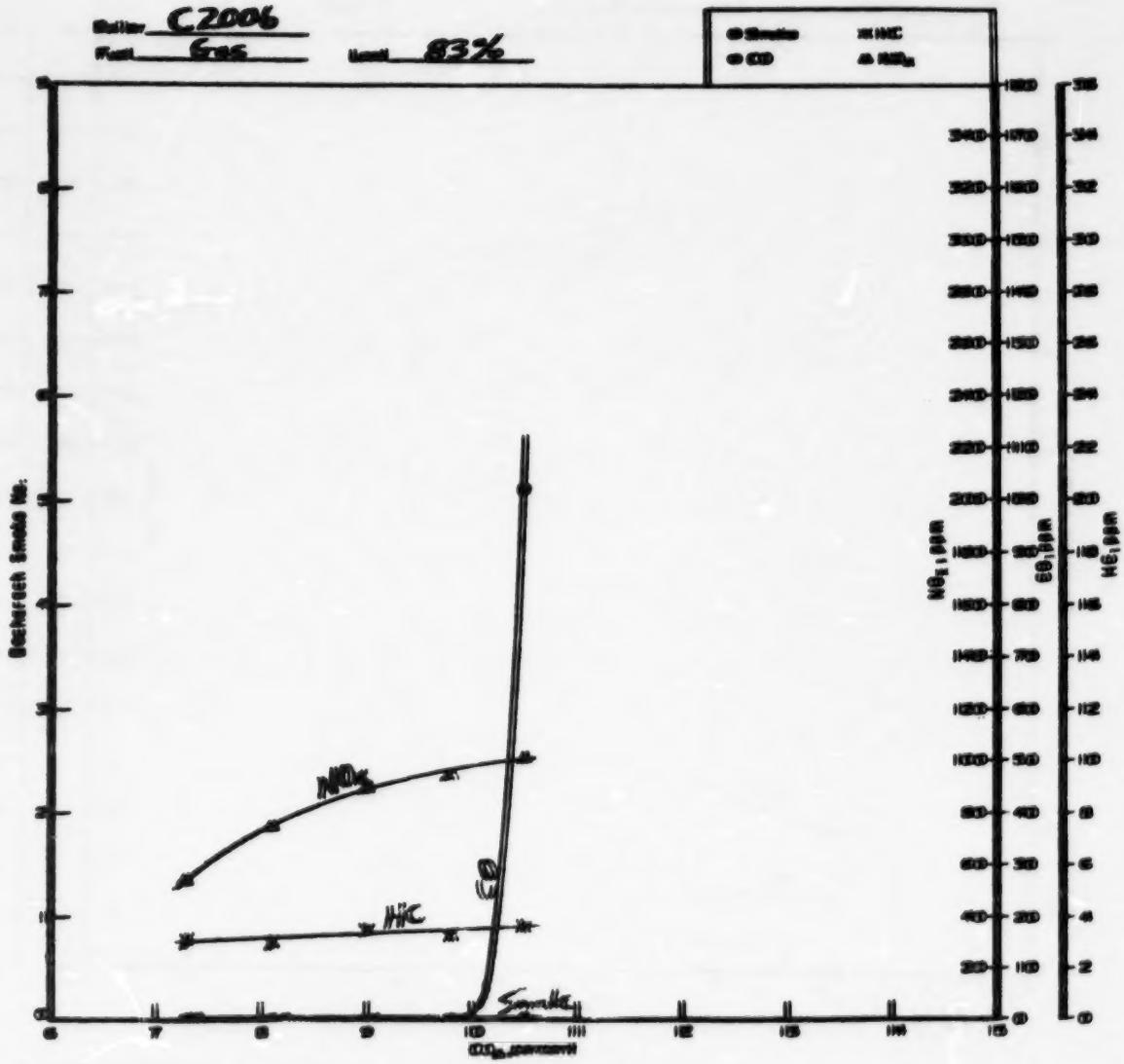
SMOKE AND EMISSIONS DATA FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

Boiler C2006 Fuel Gas

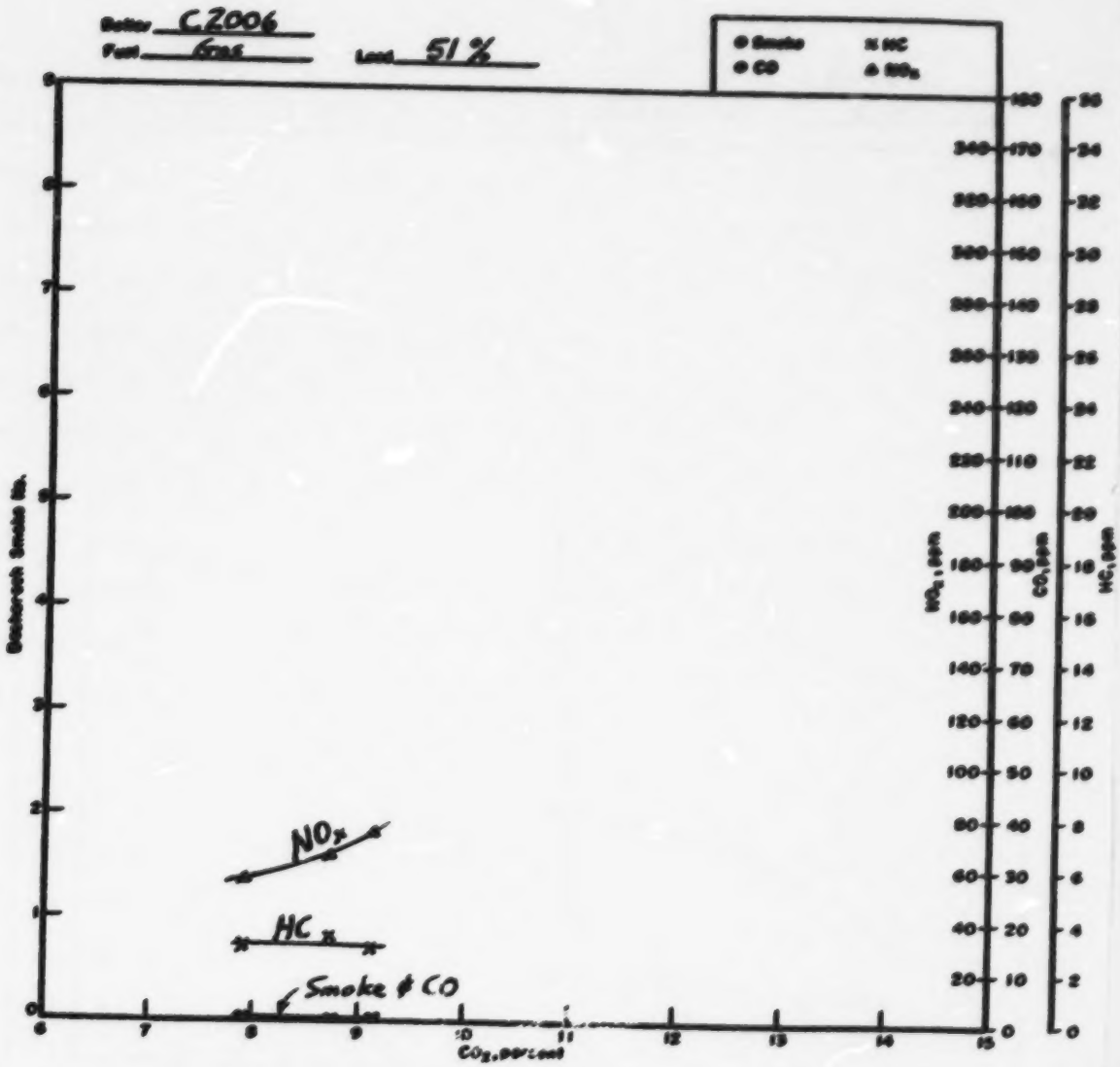
Load, percent	Firing Rate, gph	Fuel Temperature, F	Combustion Conditions			Stack Temperature, F	Gaseous Emissions, ppm					Particulate Loading, mg/m³	
			Smoke No.	CO_2, %	O_2, %		CO	HC	NO	NO_x	SO_2	Probe + filter	Total
99.	23,800.	=	0.3	8.3	5.6	436	0	3.4	76.	74.	0	=	=
			0.3	8.5	5.2	428	0	3.3	78	76.	0	=	=
			0.6	9.1	4.0	423	0	3.2	97	95.	2.	=	=
			0.5*	10.4	1.2	415	236.	3.3	110.	112.	10.	=	=
83.	20,100.	=	0.0	7.3	7.5	405	0	3.0	56.	54.	0	=	=
			0.0	8.2	5.7	395	0	3.0	75.	75.	0	=	=
			0.0	9.0	4.2	388	0	3.5	91.	90.	0	4.5	11.1
			0.0	9.8	2.7	384	0	3.2	95.	95.	2.	=	=
			0.0	10.5	1.2	381	102.	3.7	100.	101.	2.	=	=
51.	12,300.	=	0.0	7.9	6.4	340	0	2.9	55.	55.	0	=	=
			0.0	8.7	4.9	310	0	3.2	64.	63.	0	=	=
			0.0	9.1	4.1	305	0	2.9	73.	72.	0	=	=
37.	8840.	=	0.0	6.2	9.9	280	0	1.0	36.	36.	0	=	=
			0.0	7.3	7.6	273	0	1.7	44.	44.	0	=	=
			0.0	8.5	5.1	264	0	2.5	53.	53.	0	=	=
			0.0	9.1	4.0	259	0	2.1	61.	61.	0	=	=



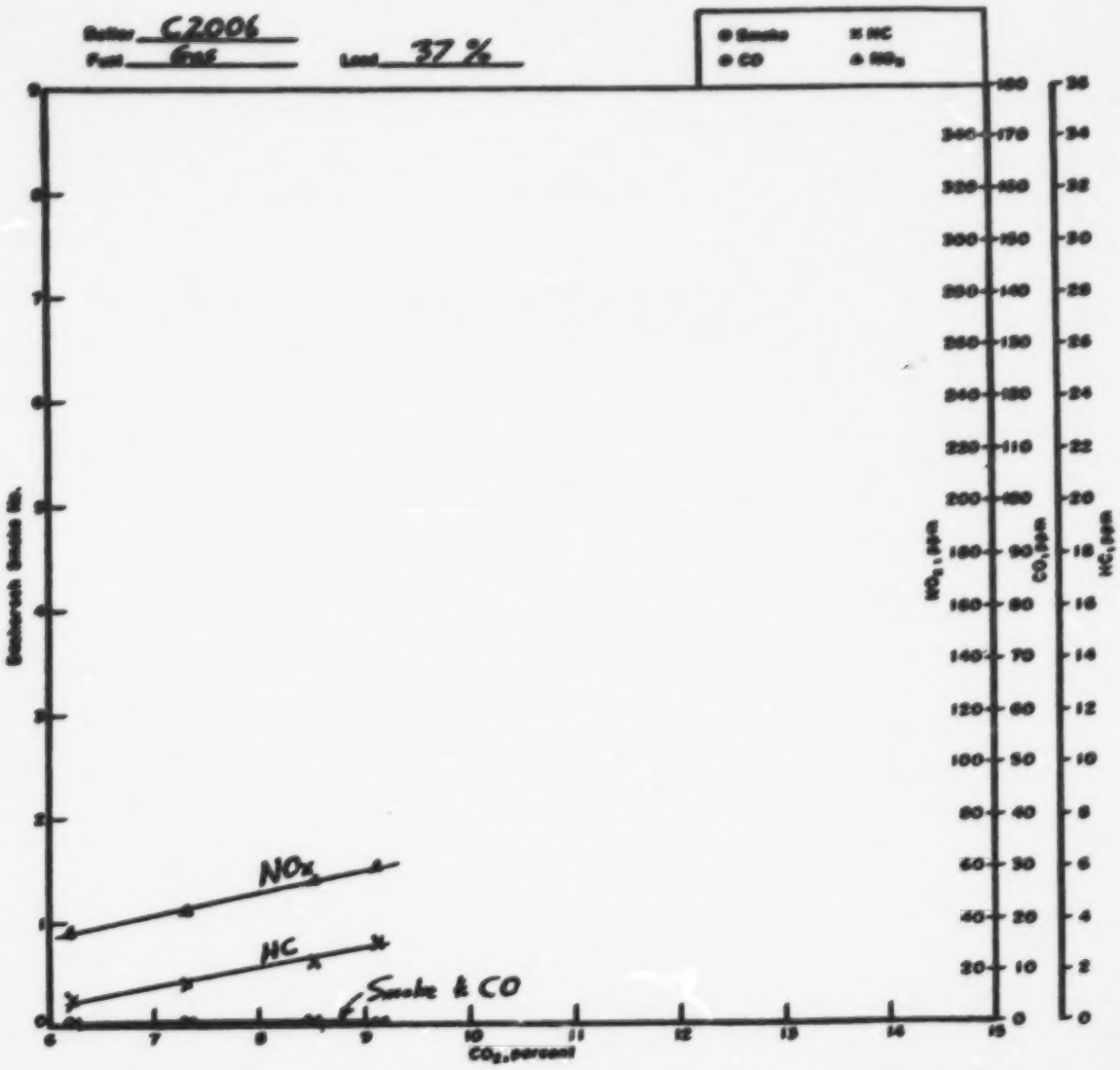
SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2



SMOKE AND GASEOUS EMISSIONS FOR COMMERCIAL BOILERS AS FUNCTION OF CO_2

APPENDIX I

CALCULATED EMISSION FACTORS FOR RESIDENTIAL UNITS

EMISSION FACTORS LBS/1000-GAL FUEL

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	CO	HC	NO	NO2	NOX	PARTICULATES FILTERABLE	PARTICULATES TOTAL
23.0	A	9.2	68.3	320.0	0.61	0.79	11.88	4.89	23.10	0.84	1.94
	T	9.9	54.5	293.7	1.17	0.55	13.34	1.75	22.20	0.48	2.68
	R	9.4	60.8	305.6	0.41	0.29	12.70	1.04	20.51	0.44	2.22
23.1(b)	A	8.8	72.4	327.8	1.20	0.67	15.02	0.00	24.25	—	—
	R	8.4	77.8	337.3	1.94	0.78	14.42	0.29	22.40	—	—
23.2	A	8.7	73.0	327.6	0.78	0.82	15.73	0.00	24.12	—	—
	R	8.8	70.7	323.2	0.49	0.47	16.01	1.68	27.15	0.91	2.55
24.0	A	7.1	119.6	415.7	48.28	1.52	9.09	13.93	27.06	0.61	2.09
	T	8.9	71.1	323.7	0.69	0.30	12.88	1.39	21.14	2.03	6.05
	R	9.2	65.1	312.3	1.55	0.42	12.08	0.54	19.09	1.76	2.92
24.1	A	8.8	72.3	325.7	3.30	0.51	10.63	0.28	16.50	—	—
	R	9.0	65.9	313.6	2.96	1.09	10.76	0.53	17.03	—	—
24.2	A	7.8	94.8	368.5	8.06	3.20	11.69	0.64	18.94	—	—
	R	8.6	75.6	332.1	3.49	2.11	12.04	0.00	18.45	1.15	3.97
25.0	A	8.4	75.3	333.3	1.03	0.53	7.76	3.97	15.07	0.28	3.14
	T	9.4	55.9	296.2	1.32	0.52	7.72	0.00	11.03	0.50	2.03
	R	8.5	73.0	328.8	2.36	0.56	8.02	1.40	13.69	0.65	1.69
25.1	A	10.8	41.7	270.1	2.16	0.69	7.33	0.00	11.24	—	—
	R	10.9	40.6	268.0	2.04	0.47	8.02	0.00	12.29	—	—
25.2	A	9.1	63.7	312.8	1.66	2.10	6.56	0.00	10.06	—	—
	R	10.1	48.1	282.7	1.72	1.83	9.77	0.48	9.33	8.81	12.85
26.0	A	7.1	108.6	397.8	1.13	0.60	11.90	3.38	21.63	1.88	4.91
	T	8.7	72.9	328.8	1.02	0.39	12.42	0.84	19.08	1.08	2.16
	R	8.8	69.9	323.0	1.79	0.42	12.02	1.38	19.81	0.87	2.32
26.1	A	9.4	62.2	305.9	1.09	0.62	11.70	1.30	19.24	—	—
	R	9.4	61.0	303.7	1.10	0.55	11.61	1.03	18.84	—	—
26.2	A	9.2	61.5	308.8	0.88	0.71	11.29	0.52	17.03	—	—
	R	9.3	65.8	317.0	0.85	0.68	11.88	0.27	18.03	0.65	2.53
27.0	A	9.1	63.7	309.4	1.09	0.31	11.53	5.36	23.03	1.31	4.70
	T	8.2	81.2	342.6	2.26	0.45	11.22	5.93	23.13	0.88	2.10
	R	8.1	83.8	346.1	2.02	0.76	12.11	2.18	20.67	—	—

(a) EPA Procedure.
(b) Decimals (.1 and .2) refer to first and second cutback.

EMISSION FACTORS LBS/1000-GAL FUEL

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	CO	HC	NO	NO2	NOX	PARTICULATES (a) FILTERABLE	PARTICULATES (a) TOTAL
28.0	A	6.6	125.5	426.6	36.23	1.60	7.43	17.63	29.02	1.98	6.58
	T	7.4	97.3	374.7	1.66	0.26	12.57	0.64	19.92	0.94	2.38
	R	7.7	89.3	359.5	1.67	0.50	12.26	4.62	23.42	—	—
29.0	A	9.4	54.7	294.0	3.70	0.39	13.27	0.50	20.05	1.91	10.13
	T	7.9	85.7	353.4	2.26	0.44	12.41	0.60	19.63	5.01	9.09
	R	7.7	83.7	349.6	2.47	2.60	12.47	2.99	22.11	—	—
30.0	A	7.5	95.4	372.4	2.26	0.91	14.05	3.46	25.02	0.98	4.94
	T	7.1	108.3	397.2	34.95	1.11	9.69	7.09	21.95	1.10	4.90
	R	6.9	114.4	408.8	42.33	1.30	8.39	7.30	20.17	—	—
31.0	A	7.9	93.7	366.1	6.97	0.42	12.62	2.22	21.56	0.77	5.05
	T	9.9	56.1	294.0	1.00	0.21	13.63	1.02	22.23	1.23	9.64
	R	9.6	59.0	300.3	0.74	0.22	14.43	1.04	23.17	—	—
32.0	A	7.0	113.7	405.0	62.63	1.54	7.12	14.00	25.72	0.96	6.00
	T	8.7	75.5	332.9	15.64	0.26	11.66	1.73	19.95	1.60	5.71
	R	8.6	75.7	333.4	7.75	0.42	11.71	1.45	19.40	—	—
33.0	A	6.1	143.2	463.2	>300.99	—	2.34	31.06	34.64	3.24	24.11
	T	6.5	130.5	436.9	>284.02	27.71	4.92	32.07	39.62	2.03	21.95
	R	6.6	127.5	433.2	>281.15	21.53	5.34	27.93	36.13	—	—
34.0	A	9.4	54.9	296.7	2.96	0.47	10.03	0.00	15.30	2.49	6.15
	T	9.8	55.1	297.2	2.24	0.34	9.40	0.00	14.41	1.44	5.11
	R	10.1	49.1	285.5	2.64	0.42	9.60	0.00	15.03	—	—
35.0	T	8.8	69.6	321.7	0.42	0.53	13.77	2.19	23.31	0.61	0.84
	R	9.3	58.0	299.5	0.59	0.69	13.99	1.79	23.24	0.39	0.69

(a) EPA Procedure

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	EMISSION FACTORS LBS/1000-GAL FUEL CO	HC	NO	NO2	NOX
23.0	A	8.9	75.3	333.9	0.17	0.35	11.09	3.97	20.97
	A	9.3	67.4	318.4	0.33	0.30	12.17	6.49	25.15
	A	9.4	62.0	308.8	1.27	0.18	9.72	10.99	25.90
	A	9.7	60.2	304.6	2.09	0.10	9.96	12.42	27.60
	T	9.5	64.4	312.6	0.48	0.21	12.30	6.90	25.76
	T	9.9	60.0	304.1	0.47	0.20	12.30	7.49	26.35
	T	10.1	57.2	298.9	0.62	0.19	12.09	8.12	26.66
	T	10.3	54.6	293.8	0.61	0.19	11.56	8.98	26.71
	T	10.5	51.4	287.8	4.17	0.09	10.84	8.36	22.98
	T	10.4	49.1	283.3	38.97	0.13	7.53	13.47	25.03
	T	10.6	49.6	284.4	2.35	0.04	9.14	11.84	25.05
	R	9.3	62.2	308.4	0.48	0.12	12.47	1.31	20.43
	R	9.3	62.2	308.4	0.80	0.09	12.01	1.31	20.98
	R	9.9	52.8	290.5	0.60	0.09	13.04	1.48	21.47
	R	10.1	50.8	286.7	0.99	0.11	11.99	1.70	19.48
	R	10.2	49.6	284.3	13.08	0.08	9.14	2.90	16.91
24.0	A	5.9	159.3	491.2	270.27	5.08	4.13	28.27	34.01
	A	6.2	149.4	464.8	107.21	2.09	6.51	25.16	38.14
	A	7.9	91.6	362.6	0.76	0.11	10.97	6.05	23.68
	A	8.8	72.8	326.8	0.91	0.09	10.26	6.18	21.90
	T	5.9	152.9	479.1	93.22	0.43	4.30	14.41	20.99
	T	6.1	143.1	460.4	39.16	0.07	9.03	7.12	20.97
	T	6.4	133.9	442.1	9.02	0.07	9.41	6.08	20.51
	T	9.3	61.2	304.9	0.00	0.09	12.30	2.10	20.96
	T	10.1	50.6	284.6	0.60	0.17	11.64	1.71	19.96
	R	5.8	156.6	486.1	193.74	5.10	4.63	13.36	20.47
	R	6.0	149.4	472.3	104.25	1.84	5.03	11.77	19.48
	R	7.4	101.9	381.4	1.00	0.11	12.82	0.00	19.66
	R	9.2	63.3	308.8	0.48	0.13	12.98	0.00	19.90
	R	10.6	42.3	268.9	2.67	0.16	11.98	0.00	18.29

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	EMISSION FACTORS LBS/1000-GAL FUEL CO	HC	NO	NO2	NOX
29.0	A	7.7	89.1	359.7	0.93	0.11	7.98	3.67	15.90
	A	7.8	86.4	354.4	0.92	0.09	7.86	3.61	15.66
	A	9.5	54.0	292.6	0.61	0.04	6.27	3.73	16.41
	A	10.6	39.1	264.1	0.96	0.04	6.20	4.49	17.06
	A	11.4	29.3	245.4	1.40	0.07	7.48	4.17	15.64
	T	9.1	62.3	308.9	0.16	0.07	6.95	0.00	13.11
	T	9.3	59.4	303.0	0.16	0.11	6.06	0.26	12.62
	T	9.5	56.1	296.6	0.19	0.19	7.09	0.29	12.39
	T	9.7	51.9	288.6	0.45	0.03	6.16	0.00	12.91
	T	10.6	40.8	267.4	0.28	0.06	7.26	0.00	11.14
	T	11.6	27.9	242.6	1.76	0.09	6.45	0.00	9.90
	R	8.6	68.8	320.8	1.16	0.10	6.54	0.27	13.36
	R	8.9	63.5	310.8	1.13	0.09	6.44	0.00	12.94
	R	9.4	54.8	294.2	1.22	0.09	6.40	0.00	13.00
	R	9.6	51.2	287.3	1.19	0.06	6.28	0.00	12.70
	R	9.9	47.1	279.3	1.30	0.08	6.05	0.00	12.34
	R	11.1	31.8	250.1	2.33	0.11	6.79	1.28	11.69
26.0	A	6.8	117.3	413.7	2.57	0.15	10.80	7.40	23.95
	A	7.1	108.8	397.0	1.65	0.14	11.46	6.09	23.66
	A	7.7	92.2	365.7	0.95	0.14	11.98	5.61	23.36
	A	8.0	84.6	351.2	0.73	0.13	12.09	4.78	23.33
	A	8.4	68.0	319.3	0.50	0.12	11.88	4.35	22.87
	A	10.9	35.9	258.0	0.27	0.10	11.46	6.01	24.39
	A	11.2	32.2	250.9	0.92	0.10	11.97	7.90	25.64
	T	7.3	107.8	395.5	2.07	0.12	12.08	3.70	22.23
	T	7.6	97.0	374.9	1.55	0.11	13.11	1.91	22.02
	T	8.3	79.8	342.0	0.71	0.12	13.30	0.87	21.26
	T	9.1	65.2	314.1	0.49	0.11	13.26	0.00	20.33
	T	9.7	54.4	293.4	0.30	0.10	12.87	0.00	19.74
	T	10.6	41.6	269.0	0.86	0.10	12.70	0.00	19.47
	T	11.4	30.7	248.0	0.77	0.10	0.00	0.00	0.00
	R	7.3	106.8	393.5	4.08	0.14	11.80	4.69	22.79
	R	7.7	95.8	372.5	2.70	0.12	12.41	4.44	23.47
	R	9.3	61.1	306.1	1.90	0.10	12.07	3.91	22.42
	R	10.8	39.9	264.8	1.91	0.09	11.32	4.28	21.65
	R	11.4	31.0	248.7	1.42	0.10	11.19	5.72	22.07

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	EMISSION FACTORS LBS/1000-GAL FUEL CO	HC	NO	NO2	NOX
27.0	A	7.1	110.0	398.0	39.93	1.93	9.46	12.77	27.27
	A	8.6	76.3	333.2	2.99	0.30	13.99	5.19	25.96
	A	9.0	67.7	317.0	1.98	0.14	13.60	3.02	23.87
	A	9.3	61.3	304.9	1.46	0.23	13.43	3.70	24.29
	A	10.4	46.9	276.8	1.17	0.14	12.19	2.64	21.33
	T	7.6	98.1	374.7	8.10	0.97	11.64	3.24	21.89
	T	8.2	83.4	348.9	2.56	0.33	12.34	2.10	21.02
	T	8.6	76.3	333.2	2.11	0.24	13.17	1.44	21.64
	T	8.9	69.2	319.9	2.02	0.14	14.27	1.38	23.26
	T	9.3	61.3	304.9	1.61	0.11	15.32	0.79	24.29
	T	10.4	46.0	275.9	1.45	0.08	14.64	0.24	22.69
	R	7.2	105.4	388.5	5.32	0.47	10.09	4.04	19.91
	R	7.7	90.1	359.4	1.89	0.24	11.97	2.18	20.94
	R	8.0	83.4	346.8	1.64	0.19	12.93	2.70	21.92
	R	8.6	72.1	325.4	1.20	—	13.78	2.94	23.46
	R	9.7	52.6	286.4	2.89	—	13.52	2.79	23.47
28.0	A	5.7	155.0	484.8	>313.69	18.11	2.44	49.87	53.61
	A	6.1	139.6	455.5	169.23	3.27	5.60	41.39	49.98
	A	6.5	126.1	429.6	27.35	2.18	7.21	31.67	42.72
	A	7.4	96.4	373.1	2.92	1.45	12.10	19.19	37.74
	T	7.3	101.3	382.4	2.39	0.39	8.34	3.61	16.39
	T	7.6	92.2	365.0	0.95	0.35	11.02	1.25	18.15
	T	7.8	85.8	352.8	0.74	0.34	12.03	1.21	19.60
	T	7.9	84.6	350.5	0.91	0.34	12.15	1.28	19.83
	T	8.1	78.7	339.3	1.24	0.30	11.57	2.04	19.78
	T	8.4	73.5	329.4	1.20	0.31	11.78	1.69	19.76
	T	8.7	68.6	320.0	1.17	0.31	11.63	1.92	19.75
	R	7.1	103.2	386.1	3.83	0.46	9.71	6.29	21.18
	R	7.3	97.8	375.7	1.97	0.39	11.76	4.19	22.22
	R	7.3	97.8	375.7	1.97	0.28	13.23	2.29	22.54
	R	7.6	90.6	361.9	1.32	0.25	13.39	4.34	24.02
	R	7.6	89.8	360.4	1.50	0.25	13.50	4.02	24.72
	R	7.9	83.1	347.7	1.27	0.24	13.41	4.17	24.74
	R	8.0	82.0	345.5	1.26	0.24	13.14	4.44	24.58

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	EMISSION FACTORS LBS/1000-GAL FUEL CO	HC	NO	NO2	NOX
29.0	A	4.0	195.2	562.0	>363.02	>16.76	2.20	18.75	22.12
	A	4.9	190.2	553.2	196.57	0.98	2.76	17.02	21.27
	A	5.1	180.7	535.1	48.16	0.48	5.67	15.98	19.66
	A	5.4	167.7	510.2	13.27	0.46	9.10	3.92	17.00
	A	5.5	162.1	499.5	8.57	0.46	10.58	2.13	16.36
	A	5.9	144.5	465.0	5.09	0.44	12.20	0.00	18.71
	A	6.3	129.1	436.4	2.72	0.48	12.09	0.00	19.77
	T	6.2	137.2	451.0	4.70	0.30	10.07	2.32	17.76
	T	6.4	127.3	433.0	2.03	0.28	11.10	1.48	18.50
	T	6.7	116.7	412.6	1.50	0.27	12.65	0.35	19.75
	T	7.1	103.7	387.0	1.01	0.30	13.10	0.33	20.55
	T	8.1	78.4	339.3	1.41	1.10	12.48	0.07	20.01
	T	8.6	69.2	321.0	3.52	1.25	12.30	0.27	19.25
	R	6.0	138.5	454.4	9.22	0.89	9.12	3.00	17.06
	R	6.2	131.0	440.0	6.41	1.10	9.01	3.76	18.00
	R	6.4	123.9	426.9	5.99	1.04	10.70	2.92	19.32
	R	6.7	113.6	406.0	5.50	2.42	11.56	1.39	19.12
	R	6.9	104.9	390.0	4.26	2.44	12.17	1.67	20.33
	R	7.2	95.9	372.1	3.48	2.11	12.44	1.27	20.30
	R	7.6	79.0	342.1	3.92	1.22	12.20	1.17	19.08
	R	8.3	75.6	334.0	4.52	0.80	12.47	0.86	19.90
	R	8.2	69.0	322.9	7.73	0.53	12.76	1.10	20.70
30.0	A	7.7	88.0	359.7	1.49	0.51	15.16	6.12	29.37
	A	7.9	85.6	353.6	1.28	0.52	14.71	6.31	28.87
	A	8.2	80.0	342.0	1.06	0.53	13.88	5.54	26.02
	A	8.3	76.0	336.6	1.22	0.40	14.19	7.16	28.92
	A	8.7	68.0	321.3	2.33	0.55	13.72	10.38	31.42
	T	5.9	145.0	460.6	35.60	0.76	6.76	11.95	22.32
	T	6.1	136.4	450.0	10.50	0.80	8.50	9.20	22.24
	T	6.7	116.5	412.8	3.42	0.76	11.22	6.67	23.07
	T	6.9	110.3	400.9	2.49	0.62	12.01	4.77	23.19
	T	8.7	66.9	317.8	3.78	1.22	9.87	4.59	19.73
	R	5.5	158.9	493.9	77.23	0.59	1.92	19.32	22.26
	R	5.7	147.3	471.8	18.14	0.45	5.23	12.84	20.06
	R	6.1	133.9	446.2	5.00	0.42	7.92	7.59	19.73
	R	6.5	120.9	421.3	1.31	0.40	10.05	5.02	20.42
	R	6.9	108.4	397.2	0.41	0.30	11.90	3.72	21.96
	R	7.3	97.2	375.8	0.50	0.21	12.30	2.88	21.74
	R	7.3	97.2	375.8	0.19	0.26	13.34	2.08	23.33
	R	7.8	85.3	352.9	0.08	0.33	13.31	2.70	23.11

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	EMISSION FACTORS LBS/1000-GAL FUEL CO	HC	NO	NO2	NOX
31.0	A	7.0	120.3	416.9	3.96	0.40	11.77	2.53	20.50
	A	7.3	110.2	397.5	3.77	0.35	13.40	1.03	21.70
	A	7.6	97.7	373.7	3.55	0.28	16.26	0.88	24.94
	A	8.2	89.4	358.0	3.21	0.30	13.76	0.93	22.03
	A	8.7	77.7	335.7	3.01	0.27	14.04	0.29	21.02
	A	9.7	60.0	302.2	3.03	0.25	13.19	0.00	20.17
	A	11.2	39.2	262.0	7.21	0.24	11.29	0.00	17.31
	T	7.4	106.0	390.9	0.62	0.44	12.15	1.02	19.65
	T	7.7	98.0	374.2	0.79	0.37	13.11	1.62	21.73
	T	8.3	84.1	347.9	0.55	0.33	14.36	1.51	23.52
	T	9.2	66.0	313.7	0.66	0.28	15.07	1.09	24.20
	T	9.3	63.9	309.6	0.65	0.24	15.58	0.88	24.69
	T	9.6	58.4	299.2	0.47	0.26	14.55	1.04	23.34
	T	10.6	44.8	273.4	0.50	0.23	12.83	0.47	20.15
	T	11.3	36.0	256.7	2.90	0.25	11.90	0.00	18.24
	R	7.3	110.2	397.5	1.05	0.24	11.91	0.69	18.95
	R	7.6	100.2	378.4	1.00	0.21	13.40	0.33	20.99
	R	8.4	82.2	344.4	0.73	0.18	14.99	0.90	23.08
	R	8.7	73.3	327.5	0.86	0.17	17.40	0.28	26.96
	R	9.5	61.4	303.0	0.64	0.16	15.07	0.79	23.90
	R	10.1	50.0	284.7	0.75	0.15	14.16	0.74	22.46
	R	11.3	35.2	255.1	4.31	0.18	12.69	0.44	19.90
32.0	A	5.8	153.0	480.7	206.31	2.04	7.62	18.36	30.05
	A	6.3	140.1	456.1	106.31	0.97	7.49	16.63	28.12
	A	6.5	127.4	432.0	30.14	0.44	9.05	10.88	24.75
	A	6.9	116.3	410.8	10.20	0.35	10.47	5.35	21.40
	A	7.2	106.7	392.4	5.01	0.30	10.89	3.07	19.76
	A	7.5	98.0	377.4	3.59	0.26	10.69	1.97	18.35
	A	8.4	78.5	338.7	4.12	0.24	9.21	0.00	15.00
	A	8.7	72.0	326.2	4.03	0.23	8.68	0.05	14.16
	T	5.4	145.7	466.9	57.00	0.20	4.76	25.94	33.24
	T	6.9	119.7	417.3	7.72	0.16	13.08	6.00	26.01
	T	7.3	108.3	395.6	3.55	0.14	13.09	4.01	26.10
	T	8.0	89.2	359.0	2.09	0.09	12.40	2.01	21.02
	T	9.1	66.9	316.6	1.00	0.05	11.40	1.65	19.25
	T	10.2	49.5	283.4	1.20	0.04	9.79	1.72	16.74
	T	10.6	43.8	272.6	1.50	0.04	9.57	1.42	16.09
	T	11.5	32.3	250.7	4.64	0.07	9.23	0.07	15.02
	R	6.2	143.4	462.4	122.60	1.20	0.64	19.67	32.92
	R	7.1	110.1	399.0	6.75	0.21	13.96	3.46	24.25
	R	8.0	86.7	354.3	2.62	0.14	13.04	0.62	20.61
	R	8.7	72.6	327.5	2.25	0.11	11.31	0.00	17.35
	R	9.1	65.0	313.0	1.02	0.08	11.92	0.00	17.67
	R	9.7	54.3	292.5	2.01	0.09	9.44	0.00	14.48
	R	11.0	33.1	252.1	0.66	0.11	8.71	0.00	13.36

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, DSF/LB FUEL	EMISSION FACTORS LBS/1000-GAL FUEL CO	HC	NO	NO2	NOX
33.0	A	3.8	265.5	697.1	>452.43	793.96	9.77	—	—
	A	5.2	174.6	523.2	>339.56	70.57	3.52	27.44	32.84
	A	6.0	143.8	464.3	>301.34	0.63	3.65	26.35	31.94
	A	6.5	123.3	425.1	>275.92	25.48	4.29	—	—
	A	6.7	121.1	420.9	>273.17	3.15	5.19	20.99	28.95
	A	7.6	94.3	369.7	123.83	1.66	6.22	15.89	25.43
	T	4.4	207.7	586.6	>380.69	254.92	4.60	>43.37	>50.43
	T	5.9	156.3	488.2	>316.87	61.46	2.74	>62.96	>67.16
	T	6.7	127.1	432.5	>280.87	19.44	2.43	≈66.92	≈70.64
	T	6.8	117.3	413.6	214.29	4.59	6.49	<42.67	<52.62
	T	7.6	101.8	383.9	152.72	7.48	4.52	≈54.47	≈61.40
	T	7.7	101.5	383.5	116.42	3.68	6.45	<41.21	<51.11
	T	8.2	88.2	357.9	67.44	4.61	6.82	<42.16	<52.31
	T	9.1	68.5	320.3	28.17	3.36	8.62	<31.39	<44.62
	R	4.7	211.0	592.7	>384.70	302.02	5.32	>24.46	>32.62
	R	5.9	153.1	482.2	>312.93	37.57	3.52	>56.79	>62.18
	R	6.7	123.4	425.4	>276.07	11.47	5.96	≈47.18	≈56.32
	R	6.9	112.5	404.5	137.61	3.52	7.71	≈29.21	≈41.04
	R	8.1	85.9	353.5	51.81	3.50	8.92	<28.88	<42.55
	R	9.3	61.0	306.1	18.90	2.57	10.13	<18.16	<33.68
34.0	A	8.6	67.7	321.5	1.96	0.13	9.61	1.07	16.12
	A	8.7	64.3	315.0	1.92	0.12	10.47	0.79	16.85
	A	8.7	62.1	310.6	2.37	0.07	11.52	0.26	17.92
	A	9.0	58.3	303.3	2.31	0.09	10.58	0.76	16.58
	A	9.1	56.3	299.5	4.42	0.15	10.12	0.75	16.27
	A	9.5	50.1	287.4	6.29	0.19	9.71	0.72	15.61
	T	8.9	65.5	317.3	1.45	0.16	10.03	1.59	16.97
	T	9.3	60.2	307.0	1.41	0.14	10.54	1.28	17.45
	T	9.3	59.0	304.8	1.40	0.14	10.96	1.27	18.09
	T	9.6	55.5	297.9	1.52	0.14	11.37	1.24	18.67
	T	9.7	53.6	294.3	1.65	0.23	10.91	0.98	17.71
	T	16.6	42.7	273.2	6.39	0.23	10.13	1.14	16.67
	R	9.6	55.5	297.9	2.88	0.10	11.69	0.88	17.93
	R	9.8	52.3	291.8	1.78	0.19	9.78	0.00	14.88
	R	10.0	49.3	285.9	2.10	0.16	9.82	0.24	15.29
	R	10.3	47.2	281.8	5.59	0.22	8.60	0.08	13.19
	R	10.3	46.7	280.9	2.29	0.14	10.10	0.08	15.49
	R	11.3	33.6	255.6	146.33	2.61	6.13	0.08	9.40

UNIT	BOND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	EMISSION FACTORS LBS/1000-GAL FUEL CO	HC	NO	NO2	NOX
35.0	T	7.1	111.1	400.7	0.42	0.39	13.81	3.42	24.60
	T	7.8	90.6	361.7	0.56	0.35	14.48	2.47	24.67
	T	8.9	68.7	319.9	0.33	0.31	14.58	2.18	24.54
	T	9.1	63.7	310.4	0.32	0.30	14.33	3.44	25.41
	T	9.7	54.2	292.3	0.15	0.27	13.81	2.49	23.67
	T	10.5	42.6	270.1	0.56	0.27	13.22	2.07	22.34
	R	7.6	93.9	368.8	0.57	0.49	14.12	0.00	21.65
	R	8.0	83.5	348.2	0.72	0.38	14.71	0.00	22.56
	R	8.2	78.4	338.4	0.70	0.37	14.86	0.00	22.79
	R	8.5	72.5	327.2	0.68	0.39	14.92	0.00	22.88
	R	8.7	68.8	318.7	0.66	0.45	15.06	0.00	23.09
	R	8.9	63.2	305.4	0.80	0.60	15.31	0.00	23.48
	R	9.1	58.3	303.9	0.63	0.47	14.87	0.00	22.80
	R	10.1	46.2	277.1	0.58	0.50	13.56	0.00	20.79
	R	11.4	30.2	246.5	2.01	0.49	12.20	0.00	18.71

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX
23.0	A	9.2	5.40	12.11	97.76	26.26	124.03
	T	9.9	10.31	7.63	109.00	9.37	119.10
	R	9.4	3.62	4.46	104.52	5.57	110.09
23.1	A	8.8	10.46	10.16	128.53	0.00	128.53
	R	8.4	13.41	11.07	117.15	1.54	118.70
23.2	A	8.7	6.75	12.44	127.45	0.00	127.45
	R	8.8	4.29	7.10	134.61	8.88	143.48
24.0	A	7.1	422.00	23.24	74.28	74.28	148.55
	T	8.9	6.08	4.60	105.27	7.41	112.68
	R	9.2	13.59	6.44	98.71	2.86	101.57
24.1	A	8.8	30.00	7.91	88.05	1.49	89.54
	R	9.0	26.29	16.81	89.07	2.87	91.94
24.2	A	7.8	69.90	40.46	94.55	3.38	97.93
	R	8.6	30.28	31.95	97.37	0.00	97.37
25.0	A	8.4	16.12	8.21	63.06	21.29	85.15
	T	9.4	11.62	7.97	63.49	0.00	63.49
	R	8.5	18.15	8.55	65.99	7.50	73.49
25.1	A	10.0	19.03	10.56	60.16	0.00	60.16
	R	10.9	17.91	7.19	65.79	0.00	65.79
25.2	A	9.1	14.63	32.25	53.99	0.00	53.99
	R	10.1	15.15	28.24	47.50	2.57	50.07
26.0	A	7.1	9.96	9.23	97.77	18.10	115.87
	T	8.7	9.00	6.10	101.96	4.50	106.46
	R	8.0	15.77	6.48	98.72	7.37	106.08
26.1	A	9.4	9.69	9.55	96.91	7.02	103.93
	R	9.4	9.76	8.50	96.19	5.58	101.77
26.2	A	9.2	7.71	10.93	92.51	2.80	95.32
	R	9.0	7.40	10.36	94.95	1.44	96.39
27.0	A	9.1	16.45	4.60	93.57	28.35	121.92
	T	8.2	19.62	6.91	91.05	31.40	122.45
	R	8.1	17.60	11.50	98.33	11.10	109.43

UNIT	COND	CO_2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX
28.0	A	6.6	317.15	25.65	60.69	93.97	154.66
	T	7.4	14.72	3.08	102.70	3.42	106.12
	R	7.7	14.61	7.72	108.17	24.63	124.80
29.0	A	9.4	33.11	5.90	108.59	2.68	111.27
	T	7.9	19.02	6.77	101.53	3.22	104.75
	R	7.7	21.68	35.85	102.02	15.94	117.96
30.0	A	7.5	19.85	13.91	115.35	18.66	134.01
	T	7.1	307.55	17.61	79.60	37.99	117.59
	R	6.9	372.45	19.93	68.90	39.11	108.01
31.0	A	7.9	60.60	6.30	102.40	11.75	114.15
	T	9.9	8.65	3.24	112.18	5.41	117.59
	R	9.6	6.47	3.30	117.04	5.51	122.55
32.0	A	7.0	541.44	23.18	57.48	77.88	135.36
	T	8.7	136.91	4.26	95.84	9.13	104.97
	R	8.6	67.03	6.40	94.45	7.62	102.07
33.0	A	6.1	▶2519.62	—	19.81	164.78	183.88
	T	6.5	▶2482.18	421.77	40.84	170.15	210.18
	R	6.6	▶2450.14	327.61	43.47	148.19	191.66
34.0	A	9.4	26.34	7.26	83.33	0.00	83.33
	T	9.8	19.92	5.25	78.68	0.00	78.08
	R	10.1	23.54	6.60	81.48	0.00	81.48
35.0	T	8.8	3.68	8.69	113.20	11.76	124.96
	R	9.3	5.28	13.14	114.99	9.58	124.57

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NC	NO2	NOX
23.0	A	8.9	1.52	5.32	91.25	21.29	112.54
	A	9.3	2.90	5.81	100.17	34.84	135.01
	A	9.4	11.23	2.81	80.04	58.98	139.02
	A	9.7	18.05	2.78	81.94	66.66	148.60
	T	9.5	4.28	3.28	101.20	37.06	138.26
	T	9.9	4.16	3.05	101.24	40.22	141.45
	T	10.1	5.45	3.00	99.49	43.61	143.10
	T	10.3	5.36	2.95	95.13	48.23	143.36
	T	10.5	36.75	1.31	89.24	34.12	123.37
	T	10.6	343.61	1.94	62.01	72.34	134.34
	T	10.6	20.75	0.65	75.21	63.54	138.74
	R	9.3	4.22	1.83	102.65	7.03	109.68
	R	9.3	7.03	1.41	105.46	7.03	112.49
	R	9.9	5.30	1.32	107.29	7.95	115.24
	R	10.1	5.23	1.70	95.42	9.15	104.57
	R	10.2	115.38	1.30	75.19	15.56	90.75
24.0	A	5.9	2366.97	90.00	33.75	150.75	184.50
	A	6.2	938.91	31.94	53.23	134.13	187.36
	A	7.9	5.64	1.66	89.69	36.54	126.24
	A	8.8	4.49	0.75	83.83	32.93	116.76
	T	5.9	816.39	6.58	35.11	76.81	111.92
	T	6.1	307.89	1.05	73.81	37.96	111.77
	T	6.4	78.58	1.01	76.95	32.40	109.35
	T	9.3	0.00	1.40	100.55	11.17	111.73
	T	10.1	5.21	2.61	95.17	9.13	104.29
	R	5.8	1696.71	77.93	37.85	71.25	109.11
	R	6.0	913.00	28.13	41.11	62.74	103.85
	R	7.4	8.74	1.75	104.82	0.00	104.82
	R	9.2	4.24	1.98	106.08	0.00	106.08
	R	10.6	23.40	2.46	97.30	0.00	97.30

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX
25.0	A	7.7	8.20	1.64	65.63	19.69	85.32
	A	7.8	8.08	0.81	64.67	19.40	84.07
	A	9.5	5.34	0.67	68.07	20.02	88.09
	A	10.6	8.43	0.60	67.47	24.10	91.57
	A	11.4	12.31	1.12	61.56	22.39	83.95
	T	9.1	1.41	1.13	70.35	0.00	70.35
	T	9.3	1.38	1.66	66.34	1.38	67.72
	T	9.5	1.35	2.98	64.95	1.35	66.30
	T	9.7	3.95	0.39	67.14	0.00	67.14
	T	10.6	2.44	0.85	59.77	0.00	59.77
	T	11.6	15.49	1.33	53.12	0.00	53.12
	R	8.6	10.24	1.46	70.24	1.46	71.71
	R	8.9	9.92	1.42	69.47	0.00	69.47
	R	9.4	10.73	1.34	69.78	0.00	69.78
	R	9.6	10.48	0.92	68.14	0.00	68.14
	R	9.9	11.47	1.27	66.25	0.00	66.25
	R	11.1	20.53	1.71	55.89	6.84	62.73
26.0	A	6.8	22.64	2.26	88.67	39.62	128.29
	A	7.1	14.48	2.17	94.15	32.59	126.73
	A	7.7	8.34	2.17	95.08	30.03	125.11
	A	8.0	6.41	1.92	99.32	25.63	124.95
	A	8.8	4.37	1.89	97.58	23.30	120.88
	A	10.9	2.35	1.53	94.15	36.48	130.64
	A	11.2	4.58	1.60	94.98	42.34	137.32
	T	7.3	25.25	1.80	99.21	19.84	119.06
	T	7.6	13.68	1.71	107.71	10.26	117.97
	T	8.3	6.24	1.87	109.19	4.68	113.87
	T	9.1	4.30	1.72	108.88	0.00	108.88
	T	9.7	2.68	1.61	105.73	0.00	105.73
	T	10.6	4.91	1.59	104.27	0.00	104.27
	T	11.4	6.79	1.47	0.00	0.00	0.00
	R	7.3	35.90	2.15	96.92	25.13	122.05
	R	7.7	23.78	1.87	101.93	23.78	125.71
	R	9.3	16.75	1.54	99.13	20.94	120.08
	R	10.8	13.29	1.45	93.01	22.95	115.96
	R	11.4	12.48	1.47	91.89	30.63	122.52

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX
27.0	A	7.1	347.21	29.24	76.75	67.61	144.37
	A	8.6	25.96	4.58	109.95	27.49	137.44
	A	9.0	13.07	2.18	110.38	15.98	126.36
	A	9.3	12.58	3.49	109.00	19.56	128.56
	A	10.4	10.15	2.16	98.95	13.95	112.90
	T	7.6	70.41	8.59	94.45	17.17	111.62
	T	8.2	22.25	5.09	100.14	11.13	111.27
	T	8.6	18.33	3.67	106.90	7.64	114.53
	T	8.9	17.59	2.20	115.82	7.33	123.15
	T	9.3	13.97	1.68	124.37	4.19	128.56
	T	10.4	12.64	1.26	118.84	1.26	120.11
	R	7.2	46.29	7.12	81.90	21.36	103.26
	R	7.7	16.47	3.62	97.18	11.53	108.71
	R	8.0	14.30	2.23	101.72	14.30	116.03
	R	8.6	10.44	—	111.84	13.42	125.26
	R	9.7	25.11	—	109.70	14.54	124.24
28.0	A	5.7	>2745.86	276.80	19.93	265.73	285.66
	A	6.1	1481.34	49.93	45.77	220.54	266.31
	A	6.5	239.40	33.36	58.87	168.76	227.63
	A	7.4	25.56	22.15	98.84	102.25	201.09
	T	7.3	20.96	5.94	68.12	19.21	87.33
	T	7.6	8.33	5.33	90.02	6.67	96.68
	T	7.8	6.45	5.16	98.30	6.45	104.74
	T	7.9	8.01	5.12	99.27	6.40	105.67
	T	8.1	10.85	4.65	94.55	10.85	105.40
	T	8.4	10.53	4.81	96.28	9.03	105.30
	T	8.7	10.23	4.68	95.00	10.23	105.23
	R	7.1	33.50	7.05	79.35	33.50	112.86
	R	7.3	13.73	6.01	96.09	22.31	118.40
	R	7.3	13.73	4.29	108.11	12.01	120.12
	R	7.6	11.57	3.80	109.10	23.14	132.24
	R	7.6	13.17	3.79	110.29	21.40	131.69
	R	7.9	11.12	3.65	109.59	22.24	131.83
	R	8.0	11.05	3.63	107.32	23.67	130.99

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX
29.0	A	4.8	>3181.94	>256.61	17.96	100.08	118.04
	A	4.9	1722.94	8.83	22.70	90.81	113.52
	A	5.1	422.15	7.32	46.36	58.56	104.93
	A	5.4	116.33	6.98	74.45	20.94	95.39
	A	5.5	75.16	7.06	86.55	11.39	97.93
	A	5.9	44.60	6.80	99.82	0.00	99.82
	A	6.3	23.88	7.36	105.47	0.00	105.47
	T	6.2	41.20	4.53	82.41	12.36	94.77
	T	6.4	17.77	4.34	90.82	7.90	98.71
	T	6.7	13.17	4.14	103.48	1.88	105.36
	T	7.1	8.84	5.83	107.86	1.77	109.63
	T	8.1	12.38	17.79	102.11	4.64	106.76
	T	8.6	30.82	19.08	101.25	1.47	102.72
	R	6.0	80.81	13.68	74.59	20.72	95.32
	R	6.2	56.18	18.06	80.25	20.06	100.31
	R	6.4	52.51	28.20	87.51	15.56	103.07
	R	6.7	48.22	37.10	94.59	7.42	102.01
	R	6.9	37.35	37.35	99.60	8.89	108.49
	R	7.2	30.54	32.23	101.79	6.79	108.58
	R	7.8	34.32	18.72	99.83	6.24	106.07
	R	8.0	39.59	12.18	102.03	4.57	106.60
	R	8.2	67.73	8.18	104.54	5.89	110.43
30.8	A	7.7	13.11	7.86	124.51	32.77	157.28
	A	7.9	11.27	8.25	120.80	33.82	154.62
	A	8.2	9.37	8.12	113.99	29.67	143.66
	A	8.3	10.73	7.36	116.54	38.34	154.88
	A	8.7	20.49	7.61	112.70	55.62	168.31
	T	5.9	313.78	11.74	55.50	64.04	119.53
	T	6.1	92.41	12.32	69.82	49.29	119.11
	T	6.7	30.09	12.03	92.14	35.73	127.87
	T	6.9	21.92	9.50	98.62	25.57	124.19
	T	8.7	33.29	18.82	81.06	24.61	105.66
	R	5.5	679.50	9.00	15.75	103.50	119.25
	R	5.7	133.24	6.88	42.98	68.77	111.75
	R	6.1	44.71	6.50	65.03	40.65	105.68
	R	6.5	11.51	6.14	82.51	26.86	109.38
	R	6.9	3.62	5.79	97.71	19.90	117.61
	R	7.3	5.14	4.79	101.01	15.41	116.42
	R	7.3	1.71	5.48	109.57	15.41	124.98
	R	7.8	0.00	5.14	109.32	14.47	123.79

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX
31.0	A	7.0	34.37	6.11	95.47	13.37	108.84
	A	7.3	32.80	5.28	109.34	5.47	114.81
	A	7.8	30.84	4.28	131.91	0.00	131.91
	A	8.2	27.90	4.60	111.60	4.92	116.52
	A	8.7	26.16	4.16	113.89	1.54	115.43
	A	9.7	26.33	3.74	106.70	0.00	106.70
	A	11.2	62.65	3.61	91.57	0.00	91.57
	T	7.4	5.38	6.63	98.57	5.38	103.95
	T	7.7	6.86	5.66	106.37	8.58	114.95
	T	8.3	4.79	4.94	116.44	7.98	124.42
	T	9.2	5.75	4.31	122.24	5.75	127.99
	T	9.3	5.68	3.69	126.34	4.26	130.60
	T	9.6	4.12	3.98	117.98	5.49	123.47
	T	10.6	5.01	3.51	104.05	2.51	106.56
	T	11.3	25.89	3.77	96.50	0.00	96.50
	R	7.3	9.11	3.64	96.59	3.64	100.23
	R	7.6	8.67	3.12	109.30	1.73	111.03
	R	8.4	6.32	2.68	121.58	4.74	126.32
	R	8.7	7.51	2.55	141.13	1.50	142.63
	R	9.5	5.56	2.36	122.24	4.17	126.41
	R	10.1	6.53	2.22	114.88	3.92	118.80
	R	11.3	37.43	2.69	102.92	2.34	105.26
32.0	A	5.8	1783.48	30.75	61.50	96.64	158.14
	A	6.3	919.03	14.59	60.43	87.53	147.96
	A	6.5	260.54	6.71	73.03	57.24	130.27
	A	6.9	88.21	5.26	84.46	28.15	112.61
	A	7.2	53.20	4.48	87.86	16.14	103.99
	A	7.5	31.04	3.97	86.22	10.35	96.56
	A	8.4	35.59	3.56	74.28	4.64	78.92
	A	8.7	41.74	3.43	70.06	4.47	74.53
	T	6.4	492.76	4.27	38.40	136.52	174.92
	T	6.9	66.73	2.67	104.86	36.22	141.08
	T	7.3	30.73	2.17	112.06	25.30	137.37
	T	8.0	18.05	0.82	100.07	14.76	114.83
	T	9.1	8.68	0.72	92.59	8.68	101.27
	T	10.2	10.36	0.65	79.00	9.07	88.06
	T	10.6	13.70	0.62	77.22	7.47	84.69
	T	11.5	40.09	1.03	74.45	4.58	79.03
	R	6.2	1060.57	19.01	69.72	103.52	173.24
	R	7.1	58.34	3.10	109.38	18.23	127.61
	R	8.0	22.66	2.10	105.23	3.24	108.47
	R	8.7	19.45	1.65	91.29	0.00	91.29
	R	9.1	15.73	0.00	92.96	0.00	92.96
	R	9.7	17.37	1.34	76.18	0.00	76.18
	R	11.3	57.59	1.61	70.26	0.00	70.26

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX
33.0	A	3.8	>3942.82	12082.63	79.49	—	—
	A	5.2	>2959.28	1073.90	28.64	145.57	174.21
	A	6.0	>2626.17	131.31	29.65	139.78	169.43
	A	6.5	>2404.58	387.84	34.91	—	—
	A	6.7	>2380.61	48.08	42.24	111.35	153.59
	A	7.6	1079.16	25.29	50.59	84.31	134.89
	T	4.8	>3317.61	3879.46	37.46	>230.09	>267.55
	T	5.9	>2761.58	935.35	22.27	>334.05	>356.32
	T	6.7	>2445.97	295.88	19.73	≈355.06	≈374.79
	T	6.8	1867.50	69.80	52.82	<226.36	<279.18
	T	7.6	1339.97	113.83	36.78	≈288.96	≈325.74
	T	7.7	1014.59	55.98	52.48	<218.66	<271.14
	T	8.2	587.73	70.20	53.87	<223.66	<277.54
	T	9.1	245.46	51.14	70.13	<166.56	<236.69
	R	4.7	>3352.55	4596.24	43.26	>129.78	>173.03
	R	5.9	>2727.17	571.83	28.59	>301.31	>329.90
	R	6.7	>2405.89	174.62	48.51	≈250.29	≈298.80
	R	6.9	1199.27	53.51	62.73	≈154.98	≈217.71
	R	8.1	491.52	53.22	72.57	<153.28	<225.76
	R	9.3	164.73	39.09	82.36	< 96.32	<178.69
34.0	A	8.6	17.48	2.04	81.56	5.83	87.38
	A	8.7	17.12	1.86	87.04	4.28	91.32
	A	8.7	21.11	1.13	95.69	1.41	97.09
	A	9.0	23.61	1.37	87.92	4.12	92.04
	A	9.1	39.35	2.31	84.13	4.07	88.20
	A	9.5	55.98	2.99	80.72	3.91	84.62
	T	8.9	12.94	2.44	83.36	8.62	91.99
	T	9.3	12.52	2.23	87.62	6.95	94.58
	T	9.3	12.42	2.21	91.11	6.90	98.01
	T	9.6	13.49	2.16	94.46	6.75	101.20
	T	9.7	14.66	3.60	90.64	5.33	95.97
	T	10.6	56.93	3.59	84.16	6.19	90.35
	R	9.6	25.64	1.62	97.16	0.00	97.16
	R	9.8	15.86	2.91	80.62	0.00	80.62
	R	10.0	19.42	2.46	81.58	1.29	82.87
	R	10.3	49.79	3.45	71.49	0.00	71.49
	R	10.3	23.35	2.16	83.96	0.00	83.96
	R	11.3	1362.77	40.53	50.95	0.00	50.95

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX
35.0	T	7.1	3.66	6.64	113.55	18.31	131.86
	T	7.8	4.96	5.45	119.01	13.22	132.23
	T	8.9	2.92	4.82	119.88	11.70	131.57
	T	9.1	2.84	4.54	117.76	18.44	136.21
	T	9.7	1.34	4.14	113.55	13.36	126.91
	T	10.5	4.94	4.20	108.64	11.11	119.75
	R	7.6	5.05	7.57	116.04	0.00	116.04
	R	8.0	6.37	5.89	120.94	0.00	120.94
	R	8.2	6.19	5.72	122.18	0.00	122.18
	R	8.5	5.98	5.98	122.64	0.00	122.64
	R	8.7	5.83	6.99	123.79	0.00	123.79
	R	8.9	7.07	9.19	125.87	0.00	125.87
	R	9.1	5.55	7.22	122.21	0.00	122.21
	R	10.1	5.07	7.73	111.46	0.00	111.46
	R	11.4	24.79	7.55	100.28	0.00	100.28

APPENDIX J

CALCULATED EMISSION FACTORS FOR COMMERCIAL BOILERS

EMISSION FACTORS LBS/1000-GAL FUEL

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	CO	HC	NO	NO2	NOX	SO2	
C2001 No. 2 oil	R	11.6	27.9	242.9	0.75	0.03	7.79	0.00	11.94	38.40	
	R	12.1	23.6	234.7	0.61	0.05	7.52	0.00	11.53	38.20	
	R	13.0	16.0	220.1	3.52	0.06	6.81	0.19	10.63	38.95	
	R	13.5	11.4	211.3	61.04	4.99	6.66	0.00	10.21	41.38	
	H	9.3	52.5	309.3	21.06	1.78	8.55	0.26	13.37	37.95	
	H	9.9	52.1	289.2	11.64	0.79	8.63	0.00	13.24	38.22	
	H	10.9	39.5	265.1	5.61	0.35	8.64	0.00	13.25	38.15	
	H	12.1	25.6	238.6	1.72	0.11	8.94	0.20	12.54	39.97	Baseline
	H	12.2	24.8	237.0	1.59	0.11	7.86	0.20	12.25	38.58	
	H	13.4	14.6	217.5	2.47	0.08	7.33	0.00	11.24	40.02	
	L	9.3	56.8	298.3	37.55	3.52	6.18	1.26	10.62	35.19	
	L	9.9	48.0	281.5	11.47	0.75	6.38	1.19	10.97	37.20	
	L	10.9	35.2	257.0	1.72	0.15	6.53	0.44	10.45	37.60	
	L	11.4	29.7	246.4	0.89	0.11	6.67	0.00	10.23	37.49	
	L	12.0	24.4	236.3	0.61	0.12	6.14	0.00	10.21	37.91	
	L	12.0	23.1	233.7	0.60	0.12	6.07	0.59	9.90	36.40	
	L	13.0	14.8	217.9	5.51	0.27	5.42	0.18	8.49	38.30	

EMISSION FACTORS LBS/MILLION-CU FT

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	CO	HC	NO	NO2	NOX	SO2	
C2001 Gas	R	7.5	51.7	329.3	296.11	69.08	56.40	12.61	99.09		
	R	7.3	43.6	311.0	154.29	32.61	66.57	5.10	107.17		
	R	8.5	36.2	294.1	78.34	28.04	77.64	1.61	120.65		
	R	9.1	27.3	273.8	20.06	23.50	67.41	0.00	103.36		
	R	9.9	17.3	250.9	25.07	0.72	69.83	4.12	111.19		
	H	7.3	55.8	338.8	372.26	164.73	66.43	11.12	103.78		
	H	7.6	48.7	322.5	279.23	101.47	66.74	10.58	112.91		
	H	8.4	37.0	295.8	121.14	31.02	72.81	3.24	114.87		
	H	9.1	27.3	273.8	46.50	18.28	69.36	5.99	112.35		Baseline
	H	9.2	24.9	268.3	42.89	18.93	68.93	0.00	105.69		
	H	10.3	14.0	243.5	288.65	11.14	53.86	6.66	89.24		
	L	6.4	74.9	382.3	446.81	342.61	49.18	18.82	94.10		
	L	7.1	58.5	344.7	332.84	200.49	61.49	15.08	109.37		
	L	7.7	46.3	317.1	244.97	108.84	67.88	8.67	112.75		
	L	8.4	36.1	293.8	174.15	72.84	68.14	9.64	114.12		
	L	9.1	24.9	268.2	43.19	34.78	67.94	2.93	107.18		

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EMISSION FACTORS LBS/1000-GAL FUEL

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	CO	HC	NO	NO2	NOX	SO2	
C2002 No. 2 oil	R	10.5	43.8	273.5	0.00	<0.08	10.13	0.46	15.99	38.72	
	R	11.0	38.0	262.2	0.00	<0.08	10.58	0.00	16.22	39.60	
	R	12.0	28.9	241.0	0.00	<0.07	10.25	0.41	16.13	39.80	
	R	13.2	15.4	219.1	9.27	<0.06	10.29	0.00	15.78	42.38	
	R	13.8	10.2	209.1	>132.65	0.62	9.47	0.00	14.53	48.34	
	M	8.5	74.9	333.0	0.34	<0.10	9.20	0.56	14.68	39.29	
	M	9.1	58.8	317.5	0.33	<0.09	9.65	0.00	14.80	39.71	
	M	10.2	49.4	284.1	0.15	<0.08	10.21	0.24	15.89	40.22	
	M	11.9	36.0	247.1	0.51	0.04	10.24	0.00	15.70	40.81	Baseline
	M	12.7	22.1	231.8	5.38	0.89	9.35	0.20	14.54	41.03	
	M	12.9	20.5	228.8	11.57	0.47	9.61	0.00	14.74	42.11	
	M	8.0	91.8	365.4	1.32	<0.11	9.49	0.00	14.55	39.66	
	M	10.1	50.6	286.5	0.89	0.10	10.13	0.24	15.78	40.55	
	M	11.0	38.4	263.1	0.81	0.16	10.61	0.22	16.50	40.97	
	M	12.0	27.2	241.7	1.37	0.23	10.02	0.20	15.56	41.05	
	M	13.3	15.0	218.3	>138.48	6.45	7.36	0.00	11.28	50.47	
	L	7.6	97.5	376.3	0.19	<0.06	9.15	0.32	14.35	35.51	
	L	8.3	83.3	349.2	0.00	<0.05	9.65	0.00	14.79	37.48	
	L	9.4	53.0	310.2	0.00	<0.05	9.94	0.00	15.24	38.79	
	L	11.0	39.3	264.8	0.00	0.06	10.24	0.00	15.71	38.74	
	L	12.1	54.3	293.5	0.00	0.13	12.00	0.25	18.65	47.43	
	L	12.7	20.7	229.2	1.42	0.07	7.73	0.19	12.04	39.21	
C2002 No. 4 oil	R	7.5	98.5	367.3	0.81	—	30.23	0.00	46.36	250.72	
	R	8.7	77.5	331.5	0.55	—	35.15	1.20	55.10	255.68	
	R	9.9	54.8	289.1	0.48	—	42.11	0.52	65.10	259.45	
	R	11.2	36.9	255.4	0.28	—	40.85	1.39	64.02	261.57	
	R	12.1	26.5	236.0	0.13	—	39.13	1.29	61.29	253.58	
	R	13.5	14.6	213.8	71.73	—	30.39	2.72	49.31	264.86	
	M	8.2	79.7	335.7	0.00	—	25.05	0.00	38.41	254.65	
	M	9.1	61.9	302.4	0.00	—	37.96	1.37	59.59	263.77	
	M	10.5	38.4	258.4	0.00	—	36.43	0.70	56.56	264.63	
	M	11.3	31.1	244.7	0.00	—	35.22	0.67	54.67	266.09	
	M	12.3	25.1	233.5	0.26	—	34.15	0.85	53.21	265.62	Baseline
	M	12.8	15.6	215.6	>146.62	—	25.80	0.59	40.15	275.35	
	M	8.0	86.5	348.3	0.19	—	34.66	1.27	54.41	262.03	
	M	9.9	52.1	284.0	0.00	—	34.14	0.52	52.87	269.28	
	M	10.9	39.5	260.5	0.14	—	32.55	0.47	50.38	270.66	
	M	12.0	26.6	236.3	0.00	—	30.22	1.93	48.27	267.62	
	M	13.3	11.6	208.1	>141.51	—	18.37	0.00	28.16	299.95	
	L	5.5	153.8	474.5	6.30	—	29.23	0.00	44.82	239.97	
	L	8.3	79.3	335.0	0.56	—	34.13	0.00	52.33	262.60	
	L	10.1	48.1	276.5	0.31	—	33.74	0.00	51.73	265.70	

EMISSION FACTORS LBS/1000-GAL FUEL

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	CO	HC	NO	NO2	NOX	SO2	
C2002 Oil	R	9.0	54.3	309.7	0.00	—	41.82	1.12	65.25	144.87	
	R	10.0	48.6	279.9	0.00	—	45.26	1.78	71.18	152.18	
	R	11.0	36.5	257.1	0.00	—	43.89	3.97	70.05	156.83	
	R	12.1	25.2	235.6	0.00	—	39.90	0.43	61.61	157.85	
	R	12.6	20.8	227.2	97.97	—	32.43	1.24	50.96	157.98	
	H	7.5	94.4	366.7	0.00	—	39.31	2.33	62.61	148.35	
	H	8.7	72.2	324.8	0.00	—	42.12	1.18	65.77	151.91	
	H	10.1	48.4	279.5	0.00	—	41.05	0.51	63.46	148.41	
	H	11.7	28.3	241.5	0.00	—	37.19	1.32	58.34	152.66	
	H	12.1	25.9	236.9	0.00	—	36.06	0.00	55.29	155.75	Baseline
	H	12.5	18.6	223.1	0.86	—	31.31	1.01	49.03	159.63	
	M	6.9	112.6	401.3	0.22	—	36.12	2.55	57.94	136.96	
	M	8.7	72.2	324.8	0.00	—	37.70	0.59	58.39	143.70	
	M	9.7	57.3	296.4	0.00	—	37.04	0.81	57.60	149.80	
	M	10.9	40.2	264.1	0.00	—	35.66	1.44	56.11	153.56	
	M	12.1	27.3	239.7	0.00	—	34.21	0.00	52.46	151.52	
	M	13.0	17.7	221.4	0.24	—	29.11	1.01	45.64	151.16	
	L	6.2	148.9	469.9	1.30	—	34.79	1.71	55.05	142.58	
	L	8.5	58.9	352.5	0.19	—	39.67	0.00	60.82	160.43	
	L	9.6	51.7	304.8	0.00	—	36.47	1.39	57.30	150.30	
	L	10.8	43.7	270.6	0.00	—	35.58	0.00	54.56	157.39	
	L	11.9	30.7	246.1	0.00	—	33.23	0.00	50.95	155.54	
	L	13.4	15.7	217.7	6.38	—	25.78	0.40	39.93	151.34	

EMISSION FACTORS LBS/MILLION-CU FT

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	CO	HC	NO	NO2	NOX	SO2	
C2002 Gas	R	7.6	50.3	326.0	3.26	0.37	93.05	0.00	142.68		
	R	8.4	37.4	296.7	0.99	0.85	87.97	0.00	134.74		
	R	9.1	26.6	272.2	2.72	0.31	82.54	1.49	128.05		
	R	9.9	17.0	250.2	2.50	0.52	81.24	0.00	124.57		
	H	7.3	47.9	320.8	0.00	0.37	67.52	5.26	108.80		
	H	8.6	35.5	292.4	0.00	0.17	90.33	0.00	123.17		
	H	10.0	16.4	249.0	0.83	0.14	82.62	1.36	128.05		Baseline
	H	10.0	16.1	248.3	0.83	0.62	80.63	1.36	124.98		
	M	7.4	52.1	330.3	0.00	0.69	74.24	0.00	113.84		
	M	8.6	32.6	285.9	0.00	0.65	79.55	0.00	121.98		
	M	9.9	16.1	248.2	0.00	0.95	78.81	2.72	123.56		
	L	6.9	55.5	360.8	1.20	1.03	63.08	0.00	96.72		
	L	8.3	38.2	298.5	0.00	0.91	80.93	0.00	124.09		
	L	9.1	25.5	269.8	0.00	0.77	85.66	0.00	131.34		
	L	9.9	16.7	249.6	4.99	0.71	78.35	1.37	121.50		

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	EMISSION FACTORS LBS/1000-GAL FUEL CO	HC	NO	NO2	NOX	SO2	
C2003	R	13.2	16.5	221.5	0.00	0.10	10.27	0.37	16.13	24.02	
No. 2 oil	R	14.5	7.0	203.3	1.15	0.24	9.65	0.00	14.00	25.16	
	H	10.0	32.7	291.2	0.03	0.26	10.29	0.49	16.27	24.02	
	H	11.2	36.6	260.2	0.00	0.19	9.33	0.44	14.75	22.69	
	H	12.1	27.7	243.1	0.00	0.18	9.39	0.21	14.61	22.91	
	H	12.1	27.3	242.3	0.09	0.21	9.36	0.00	14.36	24.56	Baseline
	H	13.3	16.4	221.3	0.00	0.20	8.67	0.37	13.68	22.95	
	H	13.9	11.9	212.8	0.00	0.19	8.22	0.54	13.15	23.57	
	M	7.6	99.1	380.2	0.00	0.28	9.23	0.64	14.80	24.19	
	M	9.3	51.7	308.4	0.00	0.21	8.51	0.26	13.31	23.26	
	M	10.5	43.2	272.8	0.00	0.18	8.13	0.46	12.93	23.14	
	M	11.9	26.5	240.7	0.00	0.14	7.71	0.20	12.82	23.54	
	M	13.1	16.0	220.6	0.00	0.13	7.06	0.56	11.39	23.91	
	L	6.6	123.1	426.3	1.54	0.63	8.47	2.53	15.52	21.10	
	L	7.5	106.4	382.7	0.20	0.68	8.66	0.97	14.25	23.45	
	L	9.7	34.4	294.4	0.00	0.61	7.96	0.25	12.46	24.20	
	L	12.0	25.6	239.1	0.00	0.32	7.13	0.20	11.13	24.23	
	L	12.6	21.0	230.3	0.00	0.61	6.86	0.39	10.91	22.79	
	L	13.0	16.7	222.0	0.00	0.39	6.74	0.19	10.52	24.06	
C2003	R	12.2	24.7	234.6	0.39	0.23	27.65	0.85	43.26	154.25	
GR	R	12.7	16.9	220.0	0.49	0.19	27.62	0.60	42.95	161.29	
	H	9.5	59.4	303.5	0.66	0.11	27.70	1.36	43.93	151.96	
	H	10.8	40.4	264.4	0.44	0.10	26.77	0.48	41.53	155.08	
	H	12.0	26.7	238.6	0.25	0.09	26.70	0.22	41.16	156.82	Baseline
	H	13.4	14.2	214.8	0.36	0.08	25.96	0.00	38.43	158.61	
	M	7.4	106.5	339.7	1.72	0.11	26.62	0.71	44.59	145.82	
	M	9.0	70.8	322.1	0.89	0.09	28.23	0.00	43.29	150.67	
	M	9.9	52.9	288.2	0.64	0.09	27.31	0.52	42.39	149.37	
	M	11.9	28.7	242.3	0.40	0.09	25.83	0.00	39.61	153.18	
	M	13.6	13.4	213.3	0.59	0.03	23.24	0.19	35.84	153.71	
	L	6.2	138.7	450.6	6.23	0.06	25.35	1.64	46.51	134.43	
	L	7.2	109.3	394.9	1.96	0.07	26.19	0.72	40.88	139.78	
	L	8.6	76.1	332.0	1.10	0.09	25.76	0.00	39.49	151.09	
	L	9.3	52.3	305.9	1.01	0.12	25.06	0.83	39.17	156.83	
	L	11.0	30.0	244.0	0.95	0.12	21.75	0.89	34.23	154.73	

EMISSION FACTORS LBS/1000-GAL FUEL

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	CO	HC	NO	NO2	NOX	SO2	
C2003 No. 6 oil	R	11.5	32.8	246.0	1.56	0.11	39.62	1.16	61.91	369.37	
	R	11.8	29.6	240.1	1.38	0.10	38.96	1.14	60.88	366.82	
	R	13.0	18.4	219.2	1.01	0.10	37.73	0.62	58.47	363.70	
	R	13.4	15.4	213.8	1.35	0.14	37.45	0.00	57.43	368.77	
	H	9.2	66.7	309.0	2.31	0.22	39.27	1.46	61.68	358.12	
	H	10.3	48.9	275.9	1.75	0.20	39.65	0.00	60.80	356.02	
	H	11.0	40.0	259.3	1.49	0.19	37.44	0.98	58.38	362.00	
	H	11.9	29.9	240.6	1.25	0.25	37.10	0.00	56.89	364.33	Baseline
	H	12.5	23.9	229.6	1.32	0.17	36.11	1.09	56.46	356.72	
	H	13.3	17.1	216.8	1.25	0.18	34.78	0.00	53.32	365.45	
	H	7.2	109.7	388.7	2.91	0.12	33.81	0.00	51.85	322.49	
	H	8.1	88.0	348.5	1.61	0.10	34.40	0.00	52.75	330.47	
	H	9.0	71.2	317.4	1.28	0.09	34.66	0.00	53.14	334.36	
	H	9.7	57.1	291.1	1.01	0.09	34.13	0.00	52.33	333.55	
	H	11.3	36.4	252.7	0.58	0.06	32.59	0.00	49.97	342.83	
	H	12.0	29.4	239.6	0.41	0.12	30.75	0.00	47.14	334.47	
	H	12.3	26.3	234.0	0.40	0.07	30.46	0.00	46.71	345.15	
	H	13.6	13.5	210.2	0.61	0.28	27.63	0.00	42.36	348.85	
	L	6.7	126.3	419.7	7.01	0.94	35.99	2.38	57.56	331.60	
	L	7.3	108.2	386.1	5.11	0.87	35.97	1.46	56.61	330.49	
	L	8.3	82.6	338.5	3.90	0.77	34.66	1.60	54.75	338.75	
	L	9.2	64.2	304.3	3.15	0.71	34.36	0.86	53.54	344.65	
	L	10.9	40.1	259.6	2.39	0.60	33.64	1.23	52.81	—	
	L	11.2	34.9	250.0	2.45	0.60	31.31	0.71	48.71	362.12	
	L	12.5	23.3	228.3	2.89	0.55	29.15	0.86	45.56	—	

EMISSION FACTORS LBS/MILLION-CU FT

C2003 Gas	R	9.6	20.8	259.0	0.86	0.59	97.96	0.00	150.21		
	R	10.0	16.4	249.0	0.83	<0.47	103.06	9.53	167.56		
	R	11.2	5.1	223.2	6.69	<0.43	97.97	4.88	155.10		
	R	11.4	2.9	218.2	744.65	<0.42	98.85	0.00	151.57		
	H	7.6	51.9	329.7	2.20	0.75	81.16	3.61	128.06		
	H	9.0	28.4	276.1	0.92	0.63	96.55	4.53	152.58		
	H	9.7	19.0	254.8	0.85	0.58	99.10	1.39	153.35		
	H	10.1	16.1	248.3	4.13	0.47	106.12	4.08	157.59		Baseline
	H	11.1	5.6	224.2	5.97	0.51	92.79	7.36	149.64		
	H	7.4	55.4	337.8	2.25	0.64	89.19	0.00	136.76		
	H	8.9	30.9	282.0	1.88	0.54	95.59	0.00	146.57		
	H	10.1	15.6	247.1	1.65	0.47	91.70	5.41	146.02		
	H	10.7	5.5	224.1	925.17	10.68	75.14	0.00	115.22		
	L	6.5	79.0	391.5	6.52	<0.75	89.40	2.14	139.22		
	L	8.3	39.5	301.5	8.03	<0.57	92.51	0.00	141.85		
	L	9.2	26.3	271.6	6.33	<0.52	88.16	1.49	136.67		
	L	10.0	16.4	249.0	5.80	<0.47	83.51	0.00	128.05		
	L	11.4	3.1	218.7	222.11	1.67	65.54	5.98	106.47		

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	EMISSION FACTORS LBS/1000-GAL FUEL CO	HC	NO	NO2	NOX	SO2	
C2004 No. 2 oil	R	11.0	45.0	276.3	0.00	0.26	14.80	0.46	23.16	31.28	
	R	11.4	37.7	262.2	0.00	0.25	14.91	0.44	23.30	31.21	
	R	12.1	24.7	237.3	0.00	0.26	14.27	0.20	22.08	28.80	
	R	12.2	26.4	240.5	0.00	0.27	14.33	0.60	22.58	30.04	
	R	14.1	9.7	208.5	3.19	0.23	11.86	0.17	18.35	30.66	
	H	9.1	55.2	315.1	0.00	0.29	14.82	0.00	22.72	29.05	
	H	11.0	38.1	263.1	0.00	0.25	14.39	0.22	22.28	29.48	
	H	12.0	26.3	240.3	0.00	0.13	13.53	0.20	20.95	28.61	Baseline
	H	12.1	25.1	238.0	0.00	0.26	13.01	0.20	20.15	29.72	
	H	13.1	16.2	221.0	0.00	0.23	12.33	0.19	19.09	29.92	
	H	14.0	9.5	208.2	4.67	0.22	11.27	0.00	17.28	30.13	
	M	7.1	139.7	400.6	2.56	0.59	10.08	0.67	16.12	26.18	
	M	8.6	73.2	330.4	0.00	0.25	12.28	0.00	18.83	27.76	
	M	10.0	49.5	284.9	0.00	0.22	12.15	0.30	18.63	27.93	
	M	10.8	39.4	265.5	0.00	0.21	12.19	0.22	18.92	28.50	
	M	12.0	26.3	240.3	0.00	0.18	12.35	0.00	18.94	28.61	
	M	12.8	19.7	227.8	0.00	0.19	12.08	0.00	18.52	28.71	
	M	14.8	4.9	199.3	2.95	0.23	10.79	0.00	16.54	29.77	
	L	6.5	123.5	427.1	27.24	1.25	9.57	0.72	15.40	24.92	
	L	7.9	58.2	359.3	0.00	0.19	12.57	0.00	19.28	29.77	
	L	9.0	56.7	318.0	0.00	0.16	12.87	0.00	19.73	29.69	
	L	10.6	41.5	269.6	0.00	0.18	14.00	0.00	21.47	29.89	
	L	11.5	31.1	249.7	0.00	0.11	12.01	0.00	18.42	29.72	
C2004 CR	R	10.6	40.8	265.1	0.00	0.52	36.42	0.00	55.85	140.76	
	R	11.1	35.5	255.2	0.00	0.51	35.07	0.46	54.23	145.18	
	R	12.1	25.2	235.6	0.00	0.47	33.21	0.00	50.92	145.93	
	R	12.9	18.4	222.8	0.00	0.44	33.79	0.00	51.80	146.49	
	H	10.0	48.1	279.0	0.15	0.47	35.03	0.00	53.72	141.10	
	H	10.9	38.2	260.2	0.00	0.44	35.45	0.00	54.35	141.47	
	H	12.1	25.2	235.6	0.00	0.40	35.02	0.00	53.70	148.91	Baseline
	H	13.2	15.9	218.1	0.00	0.38	31.90	1.19	50.10	146.12	
	H	15.0	3.6	194.8	5.06	0.34	28.03	2.30	45.28	150.21	
	M	7.4	90.6	359.5	0.99	0.59	31.08	0.00	47.66	131.78	
	M	8.5	59.1	318.7	0.18	0.53	32.28	0.00	49.50	124.92	
	M	9.6	51.6	285.7	0.00	0.48	34.01	0.00	52.15	137.25	
	M	10.5	41.4	266.3	0.00	0.46	34.70	0.73	53.94	138.05	
	M	12.2	24.3	234.0	0.00	0.44	35.20	0.85	54.82	141.99	
	M	14.0	9.4	205.7	0.34	0.40	31.67	0.56	49.12	145.61	
	L	4.7	238.1	638.9	17.66	1.11	38.97	1.16	60.92	121.15	
	L	6.5	134.6	442.9	0.24	0.57	43.28	0.00	66.36	145.56	
	L	8.0	97.1	352.8	0.00	0.48	42.00	1.20	65.69	142.74	
	L	10.0	50.6	283.8	0.00	0.40	40.50	1.03	63.13	143.50	
	L	11.9	26.9	238.8	0.26	0.38	36.78	0.00	56.39	150.97	

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	CO	HC	NO	NO2	NOX	SO2	
					EMISSION FACTORS LBS/1000-GAL FUEL						
C2004 No. 5 oil	R	11.3	36.5	251.3	0.15	0.36	43.30	0.48	66.87	371.03	
	R	12.0	28.7	237.0	0.00	0.32	43.03	1.13	67.11	369.95	
	R	13.8	13.4	208.8	0.12	0.26	39.74	0.60	61.53	373.01	
	H	9.1	58.7	310.5	0.36	0.36	42.15	1.18	65.81	357.41	
	H	10.0	53.6	282.8	0.00	0.32	42.76	0.54	66.11	362.89	
	H	10.8	42.6	262.5	0.00	0.29	43.29	0.50	66.87	364.74	
	H	12.0	29.8	239.0	0.00	0.29	43.11	0.91	67.01	366.83	Baseline
	H	13.0	20.1	221.1	0.00	0.24	42.22	0.00	64.73	371.58	
	M	7.5	100.9	369.8	2.35	0.59	38.51	1.05	60.10	347.37	
	M	8.7	72.5	317.5	0.18	0.50	39.56	1.21	61.86	357.89	
	M	9.5	59.2	293.1	0.00	0.49	39.96	0.00	61.28	360.60	
	M	10.7	43.7	264.6	0.00	0.42	41.00	0.00	62.87	367.58	
	M	12.3	26.4	232.8	0.00	0.37	41.85	1.11	65.27	372.71	
	L	5.9	159.5	477.5	83.42	1.90	29.89	3.63	49.46	341.15	
	L	6.9	120.8	406.3	3.76	0.57	37.52	1.93	59.47	354.81	
	L	8.6	76.9	325.6	0.57	0.45	39.55	0.93	61.58	366.15	
	L	12.0	29.1	237.6	0.27	0.33	41.39	0.68	64.14	377.29	
					EMISSION FACTORS LBS/MILLION-CU FT						
C2004 Gas	R	8.5	37.5	297.1	0.00	1.59	52.99	3.25	84.51		
	R	9.1	27.3	273.8	0.00	1.46	49.82	3.00	79.39		
	R	10.1	15.9	247.8	32.18	2.84	47.75	2.71	75.92		
	R	10.7	10.1	234.6	160.96	7.16	45.21	6.42	75.73		
	H	6.2	89.9	416.4	2.77	2.46	60.92	4.56	97.96		
	H	7.0	55.8	361.4	0.00	2.00	61.89	1.98	96.87		
	H	9.3	30.3	280.5	0.00	1.44	50.04	3.07	79.80		
	H	10.0	17.4	251.1	6.69	1.44	42.11	4.12	68.68		Baseline
	H	11.2	4.4	221.6	>915.12	274.70	35.58	7.27	61.83		
	M	4.7	137.9	525.8	1278.10	78.18	9.38	54.64	69.02		
	M	5.4	104.5	449.6	62.88	1.54	41.71	12.30	76.25		
	M	6.9	61.8	352.3	0.00	1.34	60.33	0.00	92.51		
	M	10.1	15.6	247.1	125.09	14.14	38.80	4.06	63.54		
	M	10.5	10.1	234.5	785.54	89.43	40.16	3.85	65.42		
	L	2.9	296.4	886.7	>3661.30	5410.71	9.49	43.65	58.20		
	L	3.5	213.8	698.7	2559.20	1398.92	4.99	49.68	57.33		
	L	4.6	144.8	541.4	600.29	134.20	5.79	38.49	47.38		
	L	5.7	97.4	433.5	118.36	3.72	27.84	30.82	73.51		
	L	7.8	47.4	319.6	0.00	1.04	58.15	1.75	90.92		
	L	9.1	27.7	274.7	6.40	0.94	47.04	0.00	72.13		
	L	9.8	19.1	255.0	33.97	1.95	41.85	2.79	66.96		
	L	11.2	5.1	223.2	>921.81	157.51	30.27	9.77	56.18		

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	EMISSION FACTORS LBS/1000-GAL FUEL CO	HC	NO	NO2	NOX	SO2	
C2005 No. 2 oil	R	12.1	25.0	237.7	0.37	0.17	17.39	1.00	27.66	53.02	
	R	12.5	21.1	230.1	1.30	0.17	16.20	0.39	25.23	52.68	
	R	13.2	14.9	218.2	14.23	0.18	14.76	0.74	23.38	52.53	
	H	9.6	54.5	294.3	0.00	0.20	19.10	0.50	29.79	49.42	
	H	10.3	45.3	276.7	0.00	0.19	18.72	0.47	29.17	50.35	
	H	11.2	34.0	254.9	0.00	0.17	17.38	0.43	27.08	50.57	
	H	12.0	25.5	238.6	0.00	0.18	16.41	0.40	25.56	50.43	Baseline
	H	13.3	14.2	216.9	2.00	0.16	14.55	0.55	22.86	50.93	
	H	14.0	7.9	204.9	>129.39	0.45	13.41	0.52	21.08	51.72	
	M	8.2	80.8	344.8	0.00	0.00	20.48	0.58	31.99	50.20	
	M	9.5	57.5	300.1	0.00	0.00	20.80	0.76	32.65	51.10	
	M	10.7	40.4	267.2	0.00	0.12	20.43	0.45	31.77	52.08	
	M	12.0	25.5	238.6	0.00	0.13	19.16	0.60	29.99	52.11	
	M	12.9	17.0	222.4	0.00	0.13	18.10	0.38	28.14	52.22	
	M	14.1	6.8	202.8	>128.04	0.24	15.95	0.68	25.14	55.95	
	L	8.5	97.3	376.4	0.00	0.35	25.88	0.63	40.31	57.89	
	L	9.7	70.4	324.7	0.00	0.35	27.15	0.82	42.45	57.95	
	L	12.0	38.4	263.4	0.00	0.33	25.93	0.44	40.21	58.45	
	L	13.6	12.7	214.0	>135.15	0.27	15.30	0.72	24.19	57.80	
C2005 CR	R	11.9	28.0	240.9	0.00	0.07	35.38	0.44	54.69	161.42	
	R	13.4	14.2	214.8	0.24	0.06	32.83	0.39	50.72	165.67	
	R	13.9	10.0	206.9	2.63	0.06	31.86	0.75	49.60	167.39	
	H	9.1	65.3	311.5	0.00	—	38.38	1.41	60.26	157.54	
	H	9.8	53.7	289.6	0.00	0.18	37.56	1.05	58.65	161.09	
	H	11.2	35.4	254.9	0.00	0.14	35.17	1.16	55.09	164.33	
	H	12.1	26.2	237.6	0.00	0.08	33.49	1.08	52.43	165.21	Baseline
	H	13.9	10.6	207.9	4.25	0.10	29.18	0.57	45.31	165.59	
	M	6.4	136.3	446.2	1.48	1.41	38.84	0.00	59.56	152.30	
	M	7.3	105.8	388.3	0.00	1.23	39.33	2.12	62.42	157.10	
	M	9.2	62.5	306.4	0.00	0.97	37.74	0.83	58.70	154.93	
	M	11.1	35.9	256.0	0.00	0.81	33.81	1.16	53.00	161.81	
	M	12.1	25.5	236.2	0.00	0.75	31.62	0.86	49.34	161.28	
	M	13.8	10.4	207.6	0.80	0.66	27.30	0.94	42.80	162.72	
	L	5.9	133.3	478.3	1.32	0.98	35.41	3.04	57.33	139.07	
	L	7.0	110.1	396.5	0.00	0.88	39.21	2.52	62.64	145.35	
	L	8.3	78.4	336.4	0.00	0.80	40.65	1.83	64.16	148.86	
	L	10.3	43.6	270.6	0.00	0.73	40.22	2.21	63.89	150.51	
	L	12.1	23.8	233.0	0.00	0.48	43.19	0.00	66.23	153.17	
	L	13.7	10.0	206.8	0.00	0.36	38.22	0.56	59.17	156.89	
	L	14.0	5.2	197.8	69.99	—	—	—	—	—	

EMISSION FACTORS LBS/1000-GAL FUEL

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	CO	HC	NO	NO2	NOX	SO2	
C2005 No. 6 oil	R	12.0	30.9	241.6	1.13	0.18	47.18	1.16	73.50	291.43	
	R	12.5	23.3	227.5	1.20	0.11	44.57	0.00	68.35	292.76	
	R	14.7	8.1	199.5	8.77	0.08	39.84	0.00	61.08	299.50	
	M	9.3	57.4	309.0	1.45	0.11	51.03	0.00	78.24	281.64	
	M	10.3	52.4	281.2	0.82	0.09	48.74	1.35	76.08	282.70	
	M	11.1	42.0	262.1	0.61	0.09	47.40	0.76	73.44	288.09	
	M	12.1	31.1	242.1	0.71	0.08	44.54	1.86	70.16	301.78	Baseline
	H	14.7	8.6	200.5	6.82	0.07	37.01	0.58	57.33	300.98	
	M	6.1	155.0	470.7	12.14	0.60	48.47	3.63	77.95	264.98	
	M	6.9	122.9	411.4	3.13	0.47	50.63	2.77	80.40	270.17	
	M	8.2	87.0	345.2	1.21	0.35	50.29	1.99	79.10	268.36	
	M	10.3	49.7	276.4	0.16	0.29	47.20	1.86	74.24	277.83	
	M	12.1	28.8	237.8	0.14	0.22	43.15	0.92	67.08	286.87	
	M	13.2	19.1	219.9	0.52	0.21	41.01	0.64	63.52	288.87	
	L	6.1	153.5	467.8	3.02	0.22	48.76	2.70	77.47	269.61	
	L	7.6	102.2	373.2	0.44	0.16	51.79	1.80	81.21	275.12	
	L	8.9	71.7	317.0	0.00	0.10	53.34	1.22	83.00	276.14	
	L	10.5	46.8	271.1	0.00	0.08	54.12	2.09	85.08	284.83	
	L	12.0	29.3	238.8	0.00	0.07	56.97	0.92	88.27	288.02	
	L	13.3	17.8	217.4	0.00	0.07	56.92	0.63	87.90	297.20	
					EMISSION FACTORS LBS/MILLION-CU FT						
C2005 Gas	R	8.5	33.4	287.7	18.20	—	68.76	1.57	107.01		
	R	9.0	26.9	272.8	18.17	—	68.14	1.49	105.97		
	R	10.0	18.3	253.3	27.83	0.68	66.87	1.39	103.92		
	R	10.5	7.1	227.7	940.38	16.50	53.63	8.72	90.95		
	M	6.7	59.8	370.6	27.15	—	68.76	2.03	107.46		
	M	7.9	43.6	311.0	20.71	—	76.55	0.00	117.38		
	M	9.5	21.7	261.1	18.26	—	59.62	2.86	94.27		
	M	10.0	15.6	247.0	55.11	3.77	55.52	2.70	87.83		Baseline
	H	10.8	6.9	227.2	938.25	—	50.26	7.46	84.53		
	M	6.0	87.4	410.7	30.09	—	106.97	0.00	164.02		
	M	7.4	52.7	331.5	20.97	—	83.98	0.00	128.76		
	M	9.3	23.3	264.6	17.62	—	61.36	1.45	95.53		
	M	10.1	13.9	243.2	61.55	324.64	53.80	2.66	85.15		
	M	10.6	7.1	227.7	940.26	173.69	46.31	4.98	75.99		
	L	4.8	127.7	502.5	138.88	7.19	64.54	24.74	123.70		
	L	6.6	68.4	367.3	0.00	2.45	106.14	4.02	166.77		
	L	8.4	33.7	288.3	0.00	2.20	88.46	0.00	135.64		
	L	10.0	13.6	242.5	896.45	10.17	52.78	7.96	88.89		

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	EMISSION FACTORS LBS/1000-GAL FUEL CO	HC	NO	NO2	NOX	SO2	
C2006 No. 2 oil	R	12.0	23.0	233.9	0.00	0.14	14.98	0.20	23.16	24.87	
	R	12.9	14.4	217.3	0.00	0.18	13.68	0.00	20.97	25.39	
	R	13.7	8.5	206.0	23.37	0.20	12.63	0.35	19.71	25.76	
	H	10.1	46.0	278.0	0.00	0.32	17.20	0.00	26.37	23.39	
	H	11.2	32.6	252.3	0.00	0.30	16.43	0.00	25.20	23.58	
	H	11.9	24.5	236.7	0.00	0.33	16.07	0.00	24.64	23.79	Baseline
	H	13.2	12.6	213.8	0.00	0.26	14.75	0.00	22.61	23.73	
	H	14.0	6.2	201.5	>126.65	0.32	13.90	0.17	21.48	26.61	
	H	8.9	54.2	312.8	0.00	0.43	16.26	0.00	24.94	24.49	
	H	9.7	51.4	288.4	0.00	0.41	16.26	0.00	24.93	24.93	
	H	10.9	34.8	256.4	0.00	0.38	16.00	0.00	24.54	24.87	
	H	11.9	24.2	236.1	0.00	0.35	15.38	0.00	23.58	25.11	
	H	13.2	12.0	212.8	0.00	0.32	13.39	0.18	20.72	25.36	
	H	13.6	8.9	206.8	87.68	0.61	12.22	0.35	19.09	26.09	
	L	9.7	49.0	283.7	0.00	0.38	14.91	0.00	22.86	24.53	
	L	11.2	30.0	247.3	0.00	0.30	14.08	0.00	21.59	25.43	
	L	12.1	21.6	231.1	0.00	0.27	12.40	0.39	19.40	25.92	
	L	12.5	18.2	224.5	0.00	0.21	11.55	0.19	17.90	25.71	
C2006 CR	R	11.7	27.6	240.2	0.00	0.36	28.87	0.00	44.27	160.91	
	R	12.1	23.8	233.0	0.00	0.35	28.70	0.00	44.01	159.06	
	R	12.9	15.8	217.7	0.00	0.36	27.47	0.00	42.12	159.65	
	R	14.0	7.1	201.4	7.57	0.34	25.04	0.00	38.40	160.37	
	H	9.9	48.8	280.4	0.00	0.51	31.55	0.00	48.38	152.44	
	H	11.1	34.3	252.9	0.00	0.50	30.11	0.00	46.16	156.67	
	H	12.0	25.0	235.2	0.00	0.46	29.25	0.00	44.86	154.63	Baseline
	H	13.3	12.9	212.4	0.00	0.42	27.30	0.00	41.85	158.42	
	H	14.0	7.1	201.4	8.68	0.43	25.04	0.00	38.40	157.83	
	H	9.7	51.8	286.1	0.00	0.77	34.40	0.00	52.74	151.91	
	H	10.9	35.5	255.2	0.00	0.69	33.55	0.00	51.45	151.63	
	H	12.0	24.0	233.3	0.00	0.63	32.33	0.00	49.58	153.38	
	H	13.0	14.8	215.8	0.00	0.59	30.42	0.00	46.65	152.81	
	H	13.6	9.9	206.6	0.23	0.57	29.12	0.00	44.65	154.11	
	L	11.5	28.5	241.8	0.00	0.67	33.09	0.00	50.73	149.81	
	L	11.9	25.8	236.8	0.00	0.64	32.68	0.00	50.11	152.70	
	L	13.8	9.4	205.6	12.84	0.55	23.75	0.00	36.41	153.37	

UNIT	COND	CO2, PERCENT	EXCESS AIR PERCENT	DRY FLUE GAS, SCF/LB FUEL	CO	HC	NO	NO2	NOX	SO2	
					EMISSION FACTORS LBS/1000-GAL FUEL						
C2006 No. 6 oil	R	12.2	24.8	231.3	0.27	0.29	37.75	0.00	57.93	204.66	
	R	13.7	11.8	207.3	0.72	0.26	34.88	0.39	53.87	208.01	
	H	10.3	46.8	272.1	0.00	0.34	40.57	0.52	62.73	201.24	
	H	11.0	38.2	256.2	0.00	0.32	39.62	0.49	61.23	202.97	
	H	12.1	28.6	234.8	0.00	0.33	38.20	0.67	59.24	204.62	Baseline
	H	12.7	20.7	223.8	0.00	0.28	37.38	0.42	57.75	206.69	
	H	13.7	12.1	207.8	0.24	0.26	35.86	0.00	54.98	205.76	
	H	6.9	118.3	404.8	5.84	0.64	43.07	5.76	71.80	192.42	
	H	8.5	75.0	324.5	0.94	0.48	42.95	1.85	67.71	197.09	
	H	9.7	53.2	284.1	0.00	0.36	43.58	0.81	67.63	198.82	
	H	11.3	33.2	247.0	0.00	0.31	43.24	0.00	66.30	202.20	
	H	11.9	27.3	236.1	0.00	0.30	42.35	0.90	65.84	202.64	
	H	13.4	13.3	210.1	0.00	0.26	38.59	0.00	59.17	208.02	
	L	11.8	31.9	244.6	0.00	0.39	42.82	0.70	66.35	200.23	
	L	12.1	25.6	232.9	0.00	0.37	40.34	1.33	63.18	199.89	
	L	13.2	17.2	217.4	0.25	0.35	35.91	0.00	55.05	200.94	
					EMISSION FACTORS LBS/MILLION-CU FT						
C2006 Gas	R	8.3	35.2	291.8	0.00	1.89	81.21	0.00	124.52		
	R	8.5	32.2	284.9	0.00	1.79	80.29	0.00	123.11		
	R	9.1	23.9	265.9	0.00	1.62	92.03	0.00	141.11		
	R	10.4	8.8	231.5	567.41	1.46	90.86	2.53	141.85		
	H	7.3	52.6	331.4	0.00	1.90	66.20	0.00	101.51		
	H	8.2	38.4	294.5	0.00	1.68	78.80	0.00	120.83		
	H	9.0	25.2	268.9	0.00	1.79	87.30	0.00	133.86		
	H	9.8	14.9	245.6	0.00	1.50	83.24	0.00	127.64		Baseline
	H	10.5	8.3	230.4	78.26	1.63	82.21	1.26	127.31		
	H	7.9	41.8	306.8	0.00	1.70	60.21	0.00	92.31		
	H	8.7	29.6	279.1	0.00	1.70	63.72	0.00	97.71		
	H	9.1	24.2	266.7	0.00	1.47	69.45	0.00	106.50		
	L	6.2	80.6	395.1	0.00	0.75	50.74	0.00	77.81		
	L	7.3	53.1	332.5	0.00	1.08	52.20	0.00	80.04		
	L	8.5	31.8	284.0	0.00	1.35	57.76	0.00	88.56		
	L	9.1	23.9	265.9	0.00	1.57	57.87	0.00	88.74		

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX	SO2	
C2001 No. 2 oil	R	11.6	6.64	0.44	64.20	0.00	64.20	148.32	
	R	12.1	5.35	0.75	62.02	0.00	62.02	147.56	
	R	13.0	31.09	0.90	56.17	1.00	57.17	150.45	
	R	13.5	539.24	77.03	54.89	0.00	54.89	159.85	
	H	9.3	186.06	27.49	70.48	1.41	71.89	146.60	
	H	9.9	102.81	12.26	71.17	0.00	71.17	147.62	
	H	10.9	49.53	5.44	71.27	0.00	71.27	147.38	
	H	12.1	15.22	1.63	66.33	1.09	67.42	154.41	Baseline
	H	12.2	14.04	1.62	64.80	1.08	65.88	149.04	
	H	13.4	21.80	1.19	60.45	0.00	60.45	154.60	
	L	9.3	331.68	54.37	50.30	6.80	57.09	135.93	
	L	9.9	101.35	11.55	52.60	6.41	59.01	143.68	
	L	10.9	15.23	2.34	53.88	2.34	56.22	145.23	
	L	11.4	7.86	1.68	55.01	0.00	55.01	144.82	
	L	12.0	5.38	1.83	50.60	4.31	54.91	146.41	
	L	12.0	5.33	1.81	50.06	3.20	53.25	140.59	
	L	13.0	48.65	4.17	44.68	0.99	45.68	147.95	
C20001 Gas	R	7.5	361.99	147.48	64.35	9.38	73.74		
	R	7.9	188.62	69.62	75.95	3.80	79.75		
	R	8.5	95.77	59.85	88.58	1.20	89.78		
	R	9.1	24.52	50.16	76.91	0.00	76.91		
	R	9.9	30.64	1.53	79.67	3.06	82.74		
	H	7.3	455.08	351.65	68.95	8.27	77.23		
	H	7.6	341.35	216.63	76.15	7.88	84.02		
	H	8.4	148.09	66.22	83.07	2.41	85.48		
	H	9.1	56.85	39.01	79.14	4.46	83.60		Baseline
	H	9.2	52.43	40.41	78.64	0.00	78.64		
	H	10.3	352.86	23.79	61.45	4.96	66.41		
	L	6.4	546.21	731.40	56.02	14.01	70.03		
	L	7.1	406.94	427.99	70.16	11.23	81.39		
	L	7.7	299.47	232.35	77.45	6.45	83.90		
	L	8.4	212.98	155.49	77.74	7.18	84.92		
	L	9.1	49.13	74.24	77.52	2.18	79.70		

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX	
C2002 No. 2 oil	R	10.5	9.00	<1.25	83.50	2.49	86.00	149.56
	R	11.0	0.00	<1.19	87.23	0.00	87.23	152.96
	R	12.3	0.00	<1.10	84.55	2.28	86.75	153.73
	R	13.2	81.85	<1.00	84.85	0.00	84.85	163.70
	R	13.8	>1171.85	9.62	78.12	0.00	78.12	186.73
	H	8.6	3.04	<1.52	75.88	3.04	78.92	151.76
	H	9.1	2.89	<1.45	79.58	0.00	79.58	153.38
	H	10.2	1.29	<1.29	84.15	1.29	85.44	155.35
	H	11.9	4.50	0.56	84.44	0.00	84.44	157.62
	H	12.7	47.54	13.73	77.12	1.06	78.18	158.47
	H	12.9	102.18	7.30	79.24	0.00	79.24	162.66
	H	8.0	11.65	<1.66	78.25	0.00	78.25	153.18
	H	10.1	7.83	1.57	83.54	1.31	84.85	156.65
	H	11.0	7.19	2.40	87.52	1.20	88.71	158.25
	H	12.0	12.11	3.52	82.59	1.10	83.70	158.58
	H	13.3	>1223.33	99.46	60.67	0.00	60.67	194.94
	L	7.6	1.71	<0.86	75.45	1.71	77.16	137.17
	L	8.3	0.00	<0.80	79.56	0.00	79.56	144.79
	L	9.4	0.00	<0.71	81.97	0.00	81.97	149.82
	L	11.0	0.00	0.97	84.47	0.00	84.47	149.63
	L	12.1	0.00	2.01	98.97	1.34	100.30	183.22
	L	12.7	12.53	1.15	63.72	1.04	64.76	151.46
C2002 No. 4 oil	R	7.8	6.81	—	236.58	0.00	236.58	919.09
	R	8.7	4.61	—	275.04	6.15	281.18	937.27
	R	9.9	4.02	—	329.54	2.68	332.22	951.10
	R	11.2	2.37	—	319.62	7.10	326.72	958.87
	R	12.1	1.09	—	306.22	6.56	312.78	929.59
	R	13.5	601.37	—	237.78	13.87	251.65	970.92
	H	8.2	0.00	—	196.03	0.00	196.03	933.49
	H	9.1	0.00	—	297.08	7.01	304.09	966.92
	H	10.8	0.00	—	285.03	3.59	288.63	970.07
	H	11.3	0.00	—	275.62	3.40	279.02	975.44
	H	12.3	2.16	—	267.24	4.33	271.56	973.74
	H	12.8	>1229.26	—	201.88	3.00	204.88	1009.39
	H	8.3	1.61	—	271.22	6.46	277.67	960.56
	H	9.9	0.00	—	267.18	2.63	269.82	987.13
	H	10.9	1.21	—	254.69	2.41	257.10	992.28
	H	12.0	0.00	—	236.51	9.85	246.36	981.07
	H	13.3	>1186.40	—	143.72	0.00	143.72	1099.59
	L	5.8	52.78	—	228.72	0.00	228.72	879.70
	L	8.3	4.66	—	267.05	0.00	267.05	962.64
	L	10.1	2.56	—	264.01	0.00	264.01	974.02
	L	11.9	1.09	—	230.07	4.36	234.43	966.06
	L	13.0	>1214.01	—	166.88	0.00	166.88	1026.48

Baseline

Baseline

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX	SO2	
C2002 CR	R	9.0	0.00	—	324.60	5.69	330.29	526.76	
	R	10.0	0.00	—	351.31	9.01	360.32	553.34	
	R	11.0	0.00	—	334.48	20.09	354.57	567.32	
	R	12.1	0.00	—	309.71	2.17	311.88	573.94	
	R	12.6	814.66	—	251.71	6.27	257.97	574.44	
	M	7.6	0.00	—	305.11	11.80	316.91	539.42	
	M	8.7	0.00	—	326.93	5.97	332.90	552.35	
	M	10.1	0.00	—	318.64	2.57	321.21	539.63	
	M	11.7	0.00	—	288.64	6.66	295.30	555.08	
	M	12.1	0.00	—	279.89	0.00	279.89	566.31	Baseline
	M	12.8	7.16	—	243.03	5.13	248.16	580.41	
	M	6.9	1.84	—	280.36	12.91	293.27	498.00	
	M	8.7	0.00	—	292.60	2.99	295.58	522.49	
	M	9.7	0.00	—	287.47	4.09	291.55	544.96	
	M	10.9	0.00	—	276.74	7.28	284.03	558.34	
	M	12.1	0.00	—	265.54	0.00	265.54	550.92	
	M	13.0	2.04	—	225.96	5.09	231.05	549.62	
	L	6.2	10.80	—	270.01	8.64	278.65	518.42	
	L	8.5	1.62	—	307.88	0.00	307.88	583.35	
	L	9.6	0.00	—	283.05	7.01	290.06	546.48	
	L	10.8	0.00	—	276.18	0.00	276.18	572.27	
	L	11.9	0.00	—	257.88	0.00	257.88	565.54	
	L	13.4	53.03	—	200.11	2.00	202.11	550.30	
C2002 Gas	R	7.6	3.98	0.80	106.18	0.00	106.18		
	R	8.4	1.21	1.81	100.26	0.00	100.26		
	R	9.1	3.32	0.66	94.18	1.11	95.28		
	R	9.9	3.06	1.12	92.78	0.00	92.78		
	M	7.8	0.00	0.78	77.04	3.92	80.96		
	M	8.6	0.00	0.36	91.66	0.00	91.66		
	M	10.0	1.91	0.30	94.27	1.01	95.29		Baseline
	M	10.[illegible]	1.01	1.31	91.99	1.01	93.01		
	M	7.[illegible]	0.00	1.48	84.71	0.00	84.71		
	M	8.6	0.00	1.40	90.77	0.00	90.77		
	M	9.9	0.00	2.02	89.93	2.02	91.95		
	L	6.9	1.47	2.28	71.90	0.00	71.90		
	L	8.3	0.00	1.94	92.34	0.00	92.34		
	L	9.1	0.00	1.65	97.73	0.00	97.73		
	L	9.9	6.10	1.52	89.40	1.02	90.41		

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX	SO2	
C2003 No. 2 oil	R	13.2	0.00	1.51	84.63	2.02	86.65	92.70	
	R	14.5	10.17	3.70	79.53	0.00	79.53	97.10	
	H	10.0	0.00	3.97	84.76	2.65	87.41	92.71	
	H	11.2	0.00	2.96	76.91	2.37	79.28	87.56	
	H	12.1	0.00	2.76	77.30	1.11	78.49	88.44	
	H	12.1	0.00	3.31	77.15	0.00	77.15	94.70	Baseline
	H	13.3	0.00	3.02	71.47	2.01	73.49	88.59	
	H	13.9	0.00	2.90	67.74	2.90	70.64	90.96	
	M	7.6	0.00	4.32	76.09	3.46	79.55	93.38	
	M	9.3	0.00	3.23	70.13	1.40	71.53	89.76	
	M	10.5	0.00	2.73	67.00	2.48	69.48	89.33	
	M	11.9	0.00	2.19	63.50	1.09	64.59	90.87	
	M	13.1	0.00	2.01	58.19	3.01	61.20	92.29	
	L	6.6	13.57	9.69	69.80	13.57	83.37	81.43	
	L	7.5	1.74	10.44	71.36	5.22	76.58	90.50	
	L	9.7	0.00	9.37	65.61	1.34	66.95	93.74	
	L	12.0	0.00	4.89	58.71	1.09	59.80	93.51	
	L	12.6	0.00	9.42	56.55	2.09	58.64	87.97	
	L	13.3	0.00	8.06	55.53	1.01	56.54	92.88	
C2003 CR	R	12.2	3.24	3.34	214.64	4.31	218.96	560.87	
	R	12.7	4.04	2.83	214.36	3.03	217.39	586.44	
	H	9.5	5.53	1.66	215.49	6.91	222.39	592.53	
	H	10.8	3.65	1.46	207.80	2.43	210.24	563.87	
	H	12.0	2.19	1.32	207.25	1.10	208.35	570.22	Baseline
	H	13.4	2.96	1.19	194.54	0.00	194.54	576.70	
	M	7.4	14.33	1.61	222.12	3.58	225.70	530.23	
	M	9.0	7.40	1.33	219.14	0.00	219.14	547.84	
	M	9.9	5.30	1.32	211.95	2.65	214.59	543.11	
	M	11.9	3.34	1.34	200.51	0.00	200.51	556.90	
	M	13.6	4.90	0.49	180.42	0.98	181.40	550.90	
	L	6.2	51.78	0.83	196.76	8.28	205.05	488.80	
	L	7.2	16.34	1.09	203.30	3.63	206.93	508.24	
	L	8.6	9.16	1.37	199.91	0.00	199.91	549.30	
	L	9.3	8.44	1.69	194.86	4.22	198.27	540.42	
	L	11.8	7.80	1.80	168.78	4.50	173.28	562.60	

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX	SO2	
C2003 No. 6 oil	R	11.5	12.63	1.61	299.71	5.74	305.46	1309.10	
	R	11.8	11.21	1.46	294.76	5.60	300.36	1300.07	
	R	13.0	8.18	1.43	285.42	3.07	288.49	1288.99	
	R	13.4	10.97	2.00	283.35	0.00	283.35	1306.99	
	H	9.2	18.75	3.17	297.12	7.21	304.33	1269.24	
	H	10.3	14.16	2.83	299.99	0.00	299.99	1261.78	
	H	11.0	12.10	2.66	283.23	4.84	288.07	1282.99	
	H	11.9	10.11	3.59	280.70	0.00	280.70	1291.23	Baseline
	H	12.5	15.71	2.46	273.21	5.36	278.57	1264.27	
	H	13.3	10.12	2.53	263.09	0.00	263.09	1295.21	
	H	7.2	23.50	1.63	255.80	0.00	255.80	1142.94	
	H	8.1	13.01	1.46	260.27	0.00	260.27	1171.22	
	H	9.0	10.37	1.33	262.19	0.00	262.19	1185.03	
	H	9.7	8.15	1.22	258.17	0.00	258.17	1182.14	
	H	11.3	4.72	0.83	246.54	0.00	246.54	1215.02	
	H	12.0	3.35	1.68	232.61	0.00	232.61	1185.42	
	H	12.3	3.28	0.98	230.46	0.00	230.46	1223.27	
	H	13.8	4.91	3.93	299.01	0.00	289.01	1236.39	
	L	6.7	56.80	13.32	272.26	11.75	284.01	1175.22	
	L	7.3	41.45	12.25	272.10	7.21	279.31	1171.29	
	L	8.3	31.59	10.90	262.23	7.90	270.13	1280.57	
	L	9.2	25.57	10.08	259.92	4.26	264.18	1221.48	
	L	10.9	19.39	8.48	254.48	6.06	260.54	—	
	L	11.2	19.83	8.52	236.84	3.50	240.34	1283.39	
	L	12.5	23.44	7.78	220.54	4.26	224.80	—	
C2003 Gas	R	9.6	1.05	1.27	111.78	0.00	111.78		
	R	10.0	1.01	<1.01	117.59	7.10	124.69		
	R	11.2	8.18	<0.91	111.78	3.64	115.42		
	R	11.4	910.32	<0.89	112.79	0.00	112.79		
	H	7.6	2.68	1.61	92.61	2.68	95.29		
	H	9.0	1.12	1.35	110.16	3.37	113.54		
	H	9.7	1.04	1.24	113.08	1.04	114.11		
	H	10.0	5.05	1.01	114.24	3.03	117.27		Baseline
	H	11.1	7.30	1.16	105.88	5.48	111.35		
	H	7.4	2.75	1.38	101.77	0.00	101.77		
	H	8.9	2.30	1.15	109.07	0.00	109.07		
	H	10.1	2.01	1.01	104.63	4.02	108.66		
	H	10.7	1131.00	22.80	85.74	0.00	85.74		
	L	6.5	7.97	<1.59	102.00	1.59	103.60		
	L	8.3	9.82	<1.23	105.56	0.00	105.56		
	L	9.2	7.74	<1.11	100.60	1.11	101.70		
	L	10.0	7.10	<1.01	95.29	0.00	95.29		
	L	11.4	271.52	3.56	74.70	4.45	79.23		

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX		
C200A No. 2 oil	R	11.3	0.00	4.02	123.16	2.51	125.68	121.91	
	R	11.4	0.00	3.82	124.04	2.39	126.42	121.65	
	R	12.1	0.00	4.10	118.73	1.08	119.81	112.26	
	R	12.2	0.00	4.16	119.25	3.28	122.53	117.06	
	R	14.1	28.45	3.68	98.64	0.95	99.59	119.51	
	H	9.1	0.00	4.59	123.26	0.00	123.26	113.23	
	H	11.0	0.00	3.95	119.69	1.20	120.88	114.98	
	H	12.0	0.00	1.97	112.58	1.09	113.68	111.49	Baseline
	H	12.1	0.00	4.61	108.24	1.08	109.33	115.82	
	H	13.1	0.00	3.52	102.55	1.01	103.56	116.63	
	H	14.0	41.66	3.41	93.74	0.00	93.74	117.42	
	H	7.1	25.51	9.11	83.82	3.64	87.47	102.05	
	H	8.6	0.00	3.91	102.19	0.00	102.19	108.20	
	H	10.0	0.00	3.50	101.08	0.00	101.08	108.05	
	H	10.8	0.00	3.26	101.43	1.21	102.64	111.09	
	H	12.0	0.00	2.73	102.75	0.00	102.75	111.49	
	H	12.8	0.00	2.98	100.50	0.00	100.50	111.89	
	H	14.0	26.29	3.63	89.75	0.00	89.75	116.05	
	L	6.5	242.83	19.43	79.65	3.89	83.53	97.13	
	L	7.9	0.00	2.94	104.60	0.00	104.60	116.04	
	L	9.0	0.00	2.46	107.05	0.00	107.65	115.73	
	L	10.6	0.00	2.82	116.51	0.00	116.51	116.51	
	L	11.5	0.00	1.70	99.93	0.00	99.93	115.83	
C200A CR	R	10.6	0.00	7.56	282.71	0.00	282.71	511.81	
	R	11.1	0.00	7.39	272.16	2.35	274.51	527.90	
	R	12.1	0.00	6.82	257.73	0.00	257.73	530.62	
	R	12.9	0.00	6.45	262.23	0.00	262.23	532.66	
	H	10.0	1.28	6.00	271.91	0.00	271.91	513.84	
	H	10.8	0.00	6.34	275.14	0.00	275.14	514.39	
	H	12.1	0.00	5.74	271.81	0.00	271.81	541.45	Baseline
	H	13.2	0.00	5.51	247.60	6.01	253.61	531.20	
	H	15.0	42.08	4.92	217.57	11.64	229.21	546.16	
	H	7.4	8.26	8.59	241.24	0.00	241.24	479.17	
	H	8.5	1.47	7.77	250.55	0.00	250.55	454.21	
	H	9.6	0.00	6.96	263.98	0.00	263.98	499.86	
	H	10.5	0.00	6.73	269.35	3.67	273.02	501.96	
	H	12.2	0.00	6.45	273.20	4.30	277.50	516.27	
	H	14.0	2.84	5.86	245.81	2.84	248.64	529.43	
	L	4.7	146.84	16.15	302.49	5.87	308.36	448.52	
	L	6.5	2.04	8.35	335.89	0.00	335.89	529.20	
	L	8.0	0.00	6.97	326.01	6.49	332.50	519.02	
	L	10.0	0.30	5.87	314.36	5.22	319.58	521.76	
	L	11.9	2.20	5.49	285.45	0.00	285.45	548.94	

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX	SO2	
C2004 No. 5 oil	R	11.3	1.18	5.67	327.72	2.36	330.08	1315.61	
	R	12.0	0.00	4.56	325.73	5.56	331.28	1311.80	
	R	13.8	0.98	3.72	300.78	2.94	303.72	1322.64	
	H	9.1	2.91	5.10	319.01	5.83	324.84	1267.32	
	H	10.0	0.00	4.51	323.68	2.65	326.33	1286.75	
	H	10.8	0.00	4.06	327.64	2.46	330.10	1293.32	
	H	12.0	0.60	4.15	326.30	4.49	330.79	1300.72	Baseline
	H	13.0	0.00	3.42	319.53	0.00	319.53	1317.55	
	H	7.5	19.08	8.33	291.45	5.20	296.66	1231.73	
	H	8.7	1.49	7.15	299.42	5.96	305.37	1266.19	
	H	9.5	0.00	6.87	302.47	0.00	302.47	1278.64	
	H	10.7	0.00	5.96	310.33	0.00	310.33	1303.38	
	H	12.3	0.00	5.24	316.74	5.46	322.26	1321.59	
	L	5.9	676.53	26.08	226.26	17.92	244.18	1209.68	
	L	6.9	30.50	8.01	284.02	9.53	293.56	1258.10	
	L	8.6	4.58	6.42	299.38	4.58	303.96	1298.31	
	L	12.0	2.23	4.68	313.28	3.34	316.62	1337.83	
C2004 Gas	R	8.5	0.00	3.39	60.47	2.42	62.88		
	R	9.1	3.00	3.12	56.85	2.23	59.08		
	R	10.1	39.35	6.65	54.48	2.02	56.50		
	R	10.7	196.77	15.28	51.58	4.78	56.36		
	H	6.2	3.39	5.26	69.51	3.39	72.90		
	H	7.0	0.00	4.27	70.61	1.47	72.09		
	H	9.0	0.00	3.09	57.10	2.28	59.38		
	H	10.0	0.18	3.07	48.04	3.07	51.11		Baseline
	H	11.2	>1110.72	586.43	40.60	5.41	46.01		
	H	4.7	1562.46	149.82	10.70	40.67	51.37		
	H	5.4	76.87	3.29	47.59	9.15	56.74		
	H	6.9	0.00	2.87	60.84	0.00	60.84		
	H	10.1	152.92	30.18	44.27	3.02	47.29		
	H	10.6	960.31	190.92	45.82	2.86	48.68		
	L	2.8	>4475.87	11550.62	10.83	32.49	43.31		
	L	3.5	3128.57	2986.36	5.69	36.97	42.66		
	L	4.6	733.04	286.48	6.61	28.65	35.26		
	L	5.7	144.70	7.94	31.76	22.94	54.70		
	L	7.8	0.00	2.21	66.35	1.30	67.65		
	L	9.1	7.83	2.01	53.67	0.00	53.67		
	L	9.8	41.52	4.15	47.75	2.08	49.83		
	L	11.2	>1126.89	336.25	34.53	7.27	41.80		

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX	SO2	
C2005 No. 2 oil	R	12.1	3.25	2.71	143.91	5.41	149.32	205.59	
	R	12.5	11.52	2.62	134.08	2.89	136.17	204.26	
	R	13.2	126.18	2.78	122.21	3.97	126.18	203.68	
	H	9.6	0.00	3.08	158.12	2.68	160.80	191.62	
	H	10.3	0.00	2.90	154.94	2.52	157.46	195.24	
	H	11.2	0.00	2.67	143.87	2.32	146.19	196.68	
	H	12.0	0.00	2.82	135.80	2.17	137.97	195.55	Baseline
	H	13.3	17.77	2.47	120.46	2.96	123.43	197.48	
	H	14.0	>1147.40	7.00	111.01	2.80	113.81	200.56	
	M	8.2	0.00	0.00	169.53	3.14	172.67	194.65	
	M	9.5	0.00	0.00	172.16	4.10	176.26	198.13	
	M	10.7	0.00	1.82	169.08	2.43	171.51	201.92	
	M	12.0	0.00	1.96	158.61	3.26	161.87	202.07	
	M	12.9	0.00	2.02	149.85	2.02	151.87	202.50	
	M	14.1	>1135.42	3.69	132.00	3.69	135.70	216.93	
	L	8.5	0.00	5.48	214.18	3.43	217.60	224.46	
	L	9.7	0.00	5.47	224.69	4.43	229.13	224.69	
	L	12.0	0.00	5.04	214.66	2.40	217.06	226.65	
	L	13.6	>1198.52	4.19	126.67	3.90	130.57	224.11	
C2005 CR	R	11.9	0.00	1.00	274.64	2.21	276.85	586.93	
	R	13.4	1.98	0.89	254.78	1.98	256.75	602.38	
	R	13.9	21.87	0.86	247.26	3.80	251.06	608.64	
	H	9.1	0.00	—	297.87	7.16	305.03	572.82	
	H	9.8	0.00	2.66	291.53	5.32	296.86	585.73	
	H	11.2	0.00	1.99	272.98	5.86	278.84	597.51	
	H	12.1	0.00	1.09	259.94	5.46	265.40	600.71	Baseline
	H	13.9	35.36	1.43	226.50	2.87	229.37	602.10	
	M	6.4	12.31	<26.51	301.49	0.00	301.49	553.76	
	M	7.3	0.00	<17.85	305.25	10.71	315.97	571.24	
	M	9.2	0.00	<14.08	292.93	4.22	297.16	563.33	
	M	11.1	0.00	<11.77	262.41	5.88	268.29	586.35	
	M	12.1	0.00	<10.86	245.43	4.34	249.77	586.42	
	M	13.8	6.68	< 9.54	211.86	4.77	216.63	591.67	
	L	5.9	10.99	14.29	274.82	15.39	290.21	505.66	
	L	7.0	0.00	12.76	304.34	12.76	317.10	528.50	
	L	8.3	0.00	11.60	315.47	9.28	324.75	541.25	
	L	10.3	0.00	10.57	312.19	11.19	323.39	547.27	
	L	12.1	0.00	6.96	335.23	0.00	335.23	556.92	
	L	13.7	0.00	5.23	296.65	2.85	299.50	570.47	
	L	14.0	582.02	—	—	—	—	—	

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX	SO2	
C2005 No. 6 oil	R	12.0	9.05	2.49	351.63	5.65	357.29	1017.58	
	R	12.8	9.58	1.60	332.22	0.00	332.22	1022.23	
	R	14.7	70.03	1.12	296.92	0.00	296.92	1045.76	
	H	9.3	11.57	1.59	380.34	0.00	380.34	983.39	
	H	10.3	6.58	1.32	363.25	6.58	369.83	987.10	
	H	11.1	4.91	1.23	353.30	3.68	356.98	1005.92	
	H	12.1	5.67	1.13	331.98	9.06	341.04	1053.72	Baseline
	H	14.7	54.42	0.94	275.86	2.81	278.68	1050.91	
	M	6.1	96.93	8.37	361.28	17.62	378.90	925.23	
	M	6.9	25.03	6.55	377.33	13.48	390.81	943.33	
	M	8.2	9.69	4.85	374.82	9.69	384.51	937.04	
	M	10.3	1.29	4.01	351.82	9.05	360.87	970.08	
	M	12.1	1.11	3.12	321.64	4.45	326.09	1001.64	
	M	13.2	4.12	2.88	305.68	3.09	308.77	1008.65	
	L	6.1	24.08	3.07	363.42	13.14	376.56	941.40	
	L	7.6	3.49	2.27	386.00	8.73	394.73	960.63	
	L	8.9	0.00	1.34	397.54	5.93	403.47	964.18	
	L	10.5	0.00	1.14	403.40	10.15	413.54	994.53	
	L	12.0	0.00	1.01	424.62	4.47	429.09	1005.68	
	L	13.3	0.00	0.92	424.24	3.05	427.29	1037.71	
C2005 Gas	R	8.6	22.25	—	78.46	1.17	79.63		
	R	9.0	22.21	—	77.74	1.11	78.85		
	R	10.0	34.02	4.53	76.30	1.03	77.33		
	R	10.5	1149.60	35.23	61.19	6.49	67.68		
	M	6.7	33.19	—	78.46	1.51	79.97		
	M	7.9	25.32	—	87.35	0.00	87.35		
	M	9.5	22.32	—	68.03	2.13	70.15		
	M	10.0	67.37	8.04	63.34	2.01	65.36		Baseline
	M	10.8	1147.00	—	57.35	5.55	62.90		
	M	6.0	36.78	—	122.05	0.00	122.05		
	M	7.4	25.64	—	95.82	0.00	95.82		
	M	9.3	21.54	—	70.01	1.08	71.09		
	M	10.1	75.24	693.04	61.38	1.98	63.36		
	M	10.6	1149.45	370.79	52.84	3.71	56.55		
	L	4.8	169.78	15.34	73.64	18.41	92.05		
	L	6.6	0.00	5.23	121.11	2.99	124.10		
	L	8.4	0.00	4.69	100.93	0.00	100.93		
	L	10.0	1095.89	21.72	60.22	5.92	66.15		

UNIT	COND	CO2, PERCENT	PPM AT 3 PERCENT OXYGEN CO	HC	NO	NO2	NOX		
C2006 No. 2 oil	R	12.0	0.00	2.24	124.57	1.06	125.63	96.89	
	R	12.9	0.00	2.77	113.75	0.00	113.75	98.91	
	R	13.7	208.20	3.19	105.04	1.88	106.91	100.35	
	H	10.1	0.00	4.94	143.02	0.00	143.02	91.13	
	H	11.2	0.00	4.59	136.67	0.00	136.67	91.88	
	H	11.9	0.00	5.07	133.64	0.00	133.64	92.68	Baseline
	H	13.2	0.00	3.99	122.63	0.00	122.63	92.46	
	H	14.0	>1128.45	5.85	115.60	0.92	116.51	103.67	
	H	8.9	0.00	6.69	135.26	0.00	135.26	95.40	
	H	9.7	0.00	6.43	135.21	0.00	135.21	97.14	
	H	10.9	0.00	5.84	133.08	0.00	133.08	96.89	
	H	11.9	0.00	5.40	127.90	0.00	127.90	97.01	
	H	13.2	0.00	5.04	111.39	0.97	112.36	98.80	
	H	13.6	781.21	9.51	101.65	1.88	103.53	101.65	
	L	9.7	0.00	5.94	123.99	0.00	123.99	95.57	
	L	11.2	0.00	4.62	117.10	0.00	117.10	99.08	
	L	12.1	0.00	4.21	103.10	2.10	105.21	101.08	
	L	12.5	0.00	3.27	96.08	1.02	97.10	100.17	
C2006 CR	R	11.7	0.00	5.30	224.09	0.00	224.09	585.07	
	R	12.1	0.00	5.14	222.77	0.00	222.77	578.34	
	R	12.9	0.00	5.20	213.18	0.00	213.18	580.50	
	R	14.0	62.94	4.91	194.37	0.00	194.37	583.12	
	H	9.9	0.00	7.48	244.91	0.00	244.91	554.28	
	H	11.1	0.00	7.32	233.68	0.00	233.68	569.66	
	H	12.0	0.00	6.70	227.06	0.00	227.06	562.26	Baseline
	H	13.3	0.00	6.15	211.86	0.00	211.86	576.03	
	H	14.0	72.20	6.29	194.37	0.00	194.37	573.87	
	H	9.7	0.00	11.18	266.97	0.00	266.97	552.36	
	H	10.9	0.00	9.97	260.42	0.00	260.42	551.35	
	H	12.0	0.00	9.12	250.96	0.00	250.96	557.70	
	H	13.0	0.00	8.53	236.13	0.00	236.13	555.61	
	H	13.6	1.90	8.26	226.04	0.00	226.04	560.34	
	L	11.6	0.00	9.67	256.80	0.00	256.80	544.73	
	L	11.9	0.00	9.25	253.67	0.00	253.67	555.24	
	L	13.8	106.81	8.63	184.31	0.00	184.31	557.66	